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PROGRESSIVE MEDICINE

A QUARTERLY DIGEST
OF
ADVANCES, DISCOVERIES AND IMPROVEMENTS
IN THE MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

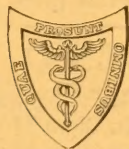
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MARCH 1, 1906



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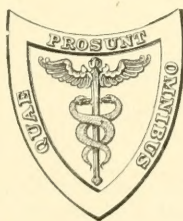
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VOLUME I. MARCH, 1906.

SURGERY OF THE HEAD, NECK AND THORAX—INFECTIOUS DISEASES, INCLUDING
ACUTE RHEUMATISM, CROUPOUS PNEUMONIA AND INFLUENZA—
THE DISEASES OF CHILDREN—RHINOLOGY
AND LARYNGOLOGY—OTOLOGY.



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PROGRESSIVE MEDICINE.

MARCH, 1906.

SURGERY OF THE HEAD, NECK AND THORAX.

BY CHARLES H. FRAZIER, M.D.

THE HEAD.

Elephantiasis of the Scalp. Every one is familiar with the usual manifestations of *elephantiasis arabum* and of the characteristic changes which take place in the affected parts, usually the legs, arms, or scrotum. So far as I know, Macdonald's¹ case of elephantiasis of the scalp is unique. The condition was noticed in a young man, born and bred in Zanzibar, who in boyhood noticed for the first time a small lump over the occiput. From that time on he suffered at intervals varying from one to three months from febrile attacks, during which the swelling increased in size. These acute outbreaks, with both local and constitutional disturbances, are characteristic of elephantiasis. The appearance of the scalp is well depicted in the illustration; the hair is scanty, the skin coarse and irregular, and measures in some places two and one-half inches thick. There was enlargement of the superficial lymphatic glands generally, including the occipital, the submaxillary, cervical, axillary, and inguinal chains. Those around the saphenous opening were especially noticeable. (See Fig. 1.)

The Treatment of Cirroid Aneurysm of the Scalp. The usual operations for cirroid aneurysm are objectionable because they are dangerous, and impracticable, or leave a defect for the repair of which a considerable period of time must be allowed. The technique has been greatly improved by the use of the subcutaneous ligature as suggested by Beck. Originally the ligatures were placed zigzag under the skin, but Krogius² has obtained better results by ligating the entire periphery of the angioma. He uses two needles curved to different degrees; the needle with the large

¹ Journal of Tropical Medicine, April 1, 1905.

² Zentralblatt f. Chirurgie, 1905, No. 39.

curve is first inserted through the skin to the bone, and brought out of the skin again at a point farther on, threaded and withdrawn. Through the same opening the second needle is inserted, pushed through the tissue directly under the skin to the point of exit, threaded with the other end of the catgut and drawn out. The two ends of the suture protruding from the same opening are tied. The second suture is so placed that it overlaps the preceding one and forms a continuous chain. In case the first operation is not completely successful a second row of sutures can afterward be introduced around the lesion, and again others, until the last trace of the tumor disappears.

Traumatism. FRACTURES OF THE SKULL. A very interesting article, chiefly because of its historical references on the subject of trephining

FIG. 1



in fractures of the skull, has been contributed by Cernezzì.¹ The author traces the history of trephining from the Hippocratic era through the middle ages down to the present time.

Hedges² had an interesting experience in dealing with a boy aged eight years, who four years ago had sustained a depressed fracture of the frontal bone. The accident was followed by a decided change in the boy's mental and moral make-up. He had great difficulty in expressing his wants and exhibited a curious and decided moral obliquity. Hedges operated upon the child, removed the depressed fragment of bone, and the year after the operation reports a very decided change for the better. The child's temperament was improved, he now is amenable

¹ *Riforma Medica*, January 21, 1905.

² *Medical Record*, January 28, 1905.

to discipline, decidedly more intelligent, and there is every reason to believe that he will soon be relieved of the ill effects of the injury. The evidence in this case is another contribution in favor of the situation of the psychical centres in the prefrontal region.

TRAUMATIC APHASIA. Traumatic disturbances of the speech are of comparative infrequency. Of 958 cases which came under the personal observation of Phelps,¹ in only a little over 2 per cent. was there some degree or form of aphasia. Using for his text a case of transitory aphasia developing on the fifth day after a compound depressed fracture of the vertex, extending into the left middle basic fossa, Phelps discusses the pathogenesis of this condition, particularly with relation to the immediate effects of traumatic intracranial lesions, hemorrhage, contusion, and laceration. Hemorrhages, *per se*, he believes, play no part in the etiology of aphasia; when large their compressing force is too diffuse, and when small it is too soft to make them effective; they may be associated, however, with other lesions, such as contusion or laceration, which are themselves directly responsible. Pial hemorrhages cannot of themselves cause aphasia. In this connection I will refer to a case which appears to me to be an exception to this general statement. I recall a case in which the symptoms of aphasia were immediately relieved by the removal of a subdural clot situated over the speech centre. The patient had scarcely recovered from the effects of the anæsthetic before he began to recover his ability to speak. Had the aphasia been due to a contusion or laceration, or lesion of the brain substance, the relief would not have been so prompt. By a process of exclusion Phelps attributes aphasia to a contusion, with or without laceration, and its associated conditions, œdema, hyperæmia, and punctate hemorrhagic extravasations. Of the 20 odd cases of aphasia, which he observed in his series of 958 cases, 7 were fatal; 5 of these exhibited at the autopsy well-marked lesions of the cerebral tissue. There are two classes of cases which must be accounted for—the immediate and permanent or long continued, accompanied by pyrexia, hemiplegia, and mental impairment, and the transitory, accompanied by trivial general symptoms. The former are unquestionably due to cerebral laceration and disintegration; the latter, to a contusion with its resulting hyperæmia and œdema. The symptoms which appear directly after an injury are due to a cerebral anæmia; if the vascular disturbance is not immediately relieved, minute thrombi form in the smaller vessels with punctate hemorrhages. This leads, after a lapse of an appreciable interval of time, to œdema. The latter in turn gives rise to certain nutritive changes in the brain tissue. In this manner one may explain the delayed appearance of signs of impair-

¹ New York and Philadelphia Medical Journal, June 10, 1905.

ment of function. To recapitulate: "If some cerebral centre is at the time lacerated focal symptoms will be immediate, and will be evident with the return of consciousness, and in some instances at an earlier period; and as the lesion will be permanent, or at least of long continuance, the functional loss will be of corresponding duration; or if such centre is involved in a limited contusion the loss or impairment of function will occur only in the later stage, when nutritive disorders have been intensified. As these later functional losses are the result of temporary conditions, they are also temporary; and as both vascular currents and serious exudations are subject to variation, they are also often variable in degree and sometimes recurrent. Illustrations of such transitory defects in function are not infrequent. Transient and inconstant paralyses, anæsthesias, and paræsthesias, as well as aphasias, will be found in the record of many cases; and by the process of exclusion they can be attributed to no other cause than the changes which have been noted as occurring in and limited to the centres themselves."

THE CLOSURE OF TRAUMATIC DEFECTS IN THE SKULL. There is some difference of opinion as to the advisability or the necessity of closing large defects in the skull, which are the result usually of compound comminuted fractures. In 1899 Kocher gave it as his opinion that these defects tended rather to prevent than to produce serious cerebral symptoms. On the other hand, a number of well-known surgeons, as von Bergmann, regard such defects as directly predisposing toward epileptic attacks. Stieda,¹ in investigating the records of some 48 cases of injuries to the skull, associated with loss of substance, disclosed the following facts: In 5 cases, in which the defect had not been closed, the patients complained of headache, vertigo, tinnitus aurium, and muscæ volitantes; on the other hand, in 15 cases in which the defect was closed immediately after the injury, 10 were completely free from any ill consequences, 3 complained only of transitory headache, 1 of attacks of vertigo, and 1 of paralysis. Of 5 cases, in which the defect was closed secondarily by implantation of boiled pieces of bone, in 4 the results were unsatisfactory, the patients complaining of headache and occasional attacks of vertigo. In 8 instances the defects were closed by an osteoplastic operation, most of them by the Müller-Koenig method; one by implantation of a piece from the tibia. Of the remaining 7, unfortunately, 1 suffers from epileptic seizures. This was a case in which there was an extensive comminution of the right frontal and temporal bones with a subdural hæmatoma, and laceration of the underlying brain substance, of which a portion had to be removed. Immediately after the injury there was a unilateral paralysis, and the wound did not entirely close for four months.

¹ Archives f. klin. Chirurgie, Band lxxvii., Heft 2.

An osteoplastic operation was then performed, and a few months later the epileptic seizures first began. The remaining 5 cases are entirely well. In 2 of these the osteoplastic operation was performed because of then existing epilepsy.

There are various methods by which defects of the skull may be closed, either at primary or secondary operations. Thus Senn suggested the use of decalcified bone, and Barth of charred bone; that is, bone in which the organic matter had been removed; the use of boiled bone was suggested by Mertens. These materials are mentioned in the relative order of their efficiency; perhaps the simplest method of all is that suggested and practised by Keen, originally some ten years ago, and on a number of occasions since then, in which the defects are filled up by a number of pieces of bone chiselled from the outer table of the skull. Keen¹ only recently reported a case in which at a secondary operation he had repaired a defect in the frontal bone by this method, with very satisfactory results; and, speaking of this method, he says that the margins of the opening should always be made rough by rongeur forceps and the pieces of bone should not be too large. He has never in a single instance seen any of the pieces of bone undergo necrosis and require removal. In a similar manner grafts of living bone have been removed from other portions of the body, or from the lower animals. In a number of instances the defect has been successfully closed by plates of ivory, silver, or celluloid. These foreign materials can, however, only be used successfully in those cases in which the wound is in an aseptic condition. Perhaps the most modern method, and the method which in the long run will give the best results, is that known in Germany as the Koenig-Müller method, which consists essentially in the transplantation of an osteoplastic flap, composed either of skin, periosteum, and bone, or of periosteum and bone alone. This method was employed by Leedham-Green² in 2 cases with gratifying results. He made use of this method also in repairing the defect following the Hartley-Krause operation for the exposure of the Gasserian ganglion. In Stieda's experience the best results were obtained by the Müller-Koenig method. In four attempts which were made to close defects, at the time covered with granulation tissue, by the introduction of boiled fragments of bone the latter underwent necrosis and had to be removed.

Nicolson's³ experience with the employment of *celluloid plates* is worthy of attention. He reports a series of six cases in which he introduced celluloid plates to cover defects, some of them three or four inches in diameter, and in every instance the wound healed without complications.

¹ Annals of Surgery, August, 1905, p. 296.

² British Medical Journal, April 15, 1905.

³ New York Medical and Philadelphia Medical Journal, January 3, 1905.

The plates he has employed are made from the convex tops of an ordinary celluloid powder and puff box, the convexity of which nearly conforms to the arch of the skull. As boiling destroys the convexity, he disinfects the plate with soap and water and immerses it overnight in a solution of 1 : 500 corrosive sublimate. After shaping the plate as nearly as possible to the opening in the skull, three or four holes are drilled obliquely through the bone, beginning about one-quarter of an inch from the edge and coming out about the margin of the inner table. Through these openings silver wires are passed and, after corresponding positioned openings have been drilled in the plate, the inner ends of the wires are drawn through the openings and the ends twisted until the plate is drawn snugly into position. He found that in several of his cases there was a collection of blood or serum between the skull and the plate, but this in every instance became absorbed. In two cases the serous collection was quite large and it was several weeks before it disappeared. My own experience with the use of celluloid is limited to one case in which there was a large compound comminuted fracture of the vault of the skull made over the longitudinal sinus. When the comminuted fragments were removed a very large defect was left in the skull and in order to protect the brain and sinus from subsequent injury, forty-eight hours after the operation, I introduced a celluloid plate slipping it in between the skull and pericranium. I did not find it necessary to use any suture material to retain the plate in its proper position. The wound healed kindly and the patient has remained now for some five years free from any disturbance arising from the presence of the plate. Although the results of the operations which Nicolson carried out are more than satisfactory, the criticism might be made, that had the osteoplastic method been used in the patients upon whom he operated, there would have been no defects left, and therefore no necessity for using celluloid plates.

Cargile Membrane and the Prevention of Adhesions. Much credit is due to Craig and Ellis¹ for their experimental and histological study of the Cargile membrane with reference to its efficiency in preventing adhesions in the abdominal and cranial cavities and around nerves and tendons, and also with reference to its elimination after its introduction in the tissues. Personally I have never been especially enthusiastic about the introduction of foreign material to prevent adhesions. It stands to reason that any foreign substance introduced into the tissues will excite more or less reaction in the tissues which will eventually lead to the formation of organized fibrous tissue and to adhesions. I have noted this excessive reaction in the tissues secondary to the introduction

¹ Annals of Surgery, June, 1905

of foreign material, particularly in the meninges. I have no doubt it is equally true of the peritoneum. The use of the Cargile membrane has been strongly recommended in operations upon the peripheral nerves to prevent the ingrowth of cicatricial tissue at the site of the anastomosis. Craig and Ellis find that when buried in living animal tissue there was no instance in their experimental experience in which so much as a fragment to the membrane was observed microscopically after the fifth day, but in spite of this finding, they express their belief that the membrane will be of value in preventing adhesions to wounded nerves when they lie in tissues which have been subjected to operation. The work is so interesting and was so well performed that I venture to quote the following conclusions at which they arrived: 1. The most distant time at which we found unchromacized Cargile membrane existing intact, macroscopically, within the peritoneal cavity, was the fourteenth day; in most instances it had disappeared to macroscopic view much sooner. The earliest time at which we found the membrane had disappeared over the area of actual denudation was on the third day.

2. Unchromacized Cargile membrane when buried in living animal tissue, as when placed around tendons and nerves or in muscle, is apparently absorbed sooner than when placed within the peritoneal cavity. In no instance was so much as a fragment of the membrane observed microscopically so late as the fifth day, though in the fragmental state membrane was noted microscopically so late as the fourteenth day.

3. Chromacized Cargile membrane when placed within the peritoneal cavity or when buried in living animal tissue remains unabsorbed much longer than does the unchromacized variety. The two varieties doubtless bear relatively the same relation to each other, so far as absorbability is concerned, as do chromacized and unchromacized catgut.

4. While the unchromacized, and to a less extent the chromacized, variety will adhere firmly to a surface denuded of peritoneum when such surface is relatively dry, yet neither can be depended upon to remain where placed, unless anchored by some method, in a situation which is subject to peristaltic activity.

5. A logical deduction from the results of the foregoing experiments seems to warrant the belief that neither variety of the membrane is of value in preventing adhesions within the peritoneal cavity. In every instance the membrane until absorbed, appeared to act as a foreign body, and therefore as an irritant.

6. We believe from the results of our observations that both varieties of the membrane are of value in preventing adhesions to wounded nerves and tendons when such structures lie in tissues which have been subjected

to trauma, operative or otherwise. Our conviction is that for this purpose the chromacized is the more valuable.

7. We believe that several layers of either variety of the membrane, when placed around tendons or nerves afford a safer and better protection than one layer.

8. We believe that, when used in the cranial cavity to replace destroyed or removed dura, the unchromacized variety would be exceedingly difficult to handle on account of its being unmanageable when moist; and we further believe, on account of the rapidity with which it dissolves, that it would be of no special value in this situation even though it could be used with ease. Owing to the facility with which the chromacized variety can be handled, its greater toughness and increased power to resist absorption, we believe that it would prove of greater value in replacing the dura.

9. Our studies indicate that the membrane is destroyed by a lytic substance, or substances, contained in the body fluid. The celloidin capsule experiments, even though bacteria were present in one, show that the membrane is softened, and at least partially absorbed by body fluids without the presence of cells. In the tissues it is split into fibrils, this change being accompanied or followed by the penetration of formative cells of the new tissue enclosing it. Fragmentation, disintegration, and absorption finally ensue. Phagocytosis may safely be excluded as a chief important contributing cause.

INTRACRANIAL TRAUMATIC HEMORRHAGE. In a systematic review of the varieties of intracranial traumatic hemorrhage Wright¹ classifies hemorrhages first according to whether they are epidural, pial, cortical, or subcortical. He recognizes three types of traumatic apoplexy: first, that occurring simultaneously with the injury in which the patient immediately after a blow upon the head develops symptoms of hemorrhage of internal parts of the brain. The symptoms are those of spontaneous apoplexy, and they may be quickly fatal. In these cases the injury may not be severe, but there pre-exists a weakness of the walls of the cerebral arteries which, when subjected to a sudden rise in blood pressure, rupture. The second type is the traumatic apoplexy occurring shortly after the injury, the so-called "traumatische spät apoplexie" (this condition was reviewed in the March, 1903, issue of *PROGRESSIVE MEDICINE*). The symptoms come on from a few days to weeks after the injury, and the hemorrhage, which is fatal, takes place in the neighborhood of the fourth ventricle and aqueduct of Sylvius. The third type is that in which the apoplectic symptoms do not appear until long after the injury, and are probably due to the slow propagation of a thrombus.

¹ Medical News, April 15, 1905.

PUNCTURE OF THE BRAIN.—For diagnostic and therapeutic purposes Neisser and Pollack¹ have elaborated a method of puncturing the brain by a very simple operative procedure. They have practised this method 136 times on thirty-six patients and have found it most satisfactory and unattended with risk. The scalp is shaved and at the point determined upon by the nature of the case a very small hole is made through the scalp and skull with a small drill measuring only 2.3 mm. in diameter. The drill is operated with an electric motor, and with a little practice the hole may be drilled without any danger of injuring the dura. After the dura is reached, the drill is withdrawn and a small graduated needle is introduced to the desired depth. The operation may be done under local anæsthesia and it is astonishing how well it is borne by the patient. There is at the most only a slight expression of pain in cutting through the periosteum and the dura. The points at which the needle was introduced were those at which one most frequently finds abscesses and hemorrhage. The only point at which there may be said to be any danger is at the lowermost portion of the central fissure, where an artery or vein may be injured, and also in the region of the centre for the facial and hypoglossal nerves. In eleven of the thirty-six cases in which this method was practised a central hemorrhage was discovered and in two instances the blood clot was so completely removed by the operation that the patients entirely recovered. The method was of special value in a case in which there was a tremendous intradural hæmatoma. In the differential diagnosis of obscure cases they have used this method without exception. It gives the operator a certain assurance, saves him time and trouble and may spare the patient from what might prove to be an unnecessarily formal operation.

Cranial Vessels. **TRAUMATIC EXOPHTHALMUS PULSANS.** Some 200 cases of pulsating exophthalmus have been published, the majority, 71 per cent., being of traumatic origin. In addition to the conditions which result from the disturbance of the circulation in the internal carotid artery and cavernous sinus, paralysis of the facial nerve is a common symptom. This has been accounted for in two ways: in those cases which are due to traumatism involvement of the facial nerve has been attributed to fracture of the petrous portion of the temporal bone. This does not, however, account for cases of spontaneous pulsating exophthalmus. In the latter it might be due, according to Slowman, to the engorgement of the superior and inferior petrosal sinuses, resulting from the obstruction to the circulation of the cavernous sinus, and causing compression upon the nerve before its entry into the internal auditory meatus. In substantiation of this view cases have been reported in which ligation of the common carotid relieved not only the exoph-

¹ Zentralblatt f. Chirurgie, 8.

thalmus, but also the paralysis. Kennedy¹ reported a case of traumatic exophthalmus in which the symptoms were relieved by ligation of the right common carotid artery. The eye became retracted nearly to its normal position, but vision was never regained. It was found upon examination of the eye that the optic nerve was atrophied. Ligation of the common carotid artery is the only method of treatment worthy of consideration, and will be followed by absolute cure, or at least by improvement, in the majority of cases (70 per cent.). In some cases it will be necessary to ligate the internal carotid on the opposite side. This operation should not be undertaken, however, until considerable time has elapsed since the first operation was performed, in order to enable the collateral circulation to become thoroughly established.

Cranial Sinuses. INFECTIVE THROMBOSIS OF THE LATERAL, SIGMOID, SUPERIOR PETROSAL SINUSES, AND JUGULAR VEIN. One of the risks attending operation in the presence of infective thrombi is the dislodgement of a fragment of the thrombus and its escape into the general circulation. Richards,² in the course of an operation upon a case of infective thrombosis of the lateral, sigmoid, superior petrosal sinuses, and internal jugular vein, after he had ligated the internal vein at the base of the neck and laid open the sigmoid sinus and the lateral sinus up to within one inch of the torcular. When he exerted pressure at the base of the neck over the course of the internal jugular vein on the opposite side, there immediately followed a spurt of blood and the extrusion of a thin, small, liver-colored clot, which represented the axis of the extreme torcular end of the clot. This is the first time such a procedure has been adopted, in the removal of a thrombus from the torcular end of the lateral sinus, to prevent emboli passing into the general circulation. Pressure upon both internal jugular veins creates a back pressure, which not only prevents embolism, but may express the thrombus.

METHOD OF APPROACHING THE CAVERNOUS SINUS. Thrombosis of the cavernous sinus almost invariably terminates fatally, partly because the sinus is believed to be inaccessible and partly because the cavernous sinus is only one of a number of others which are the seat of a thrombotic process. Several years ago Germain and Dwight (see *PROGRESSIVE MEDICINE*, March, 1903) reported a series of cases, in one of which they were successful in reaching the sinus and removing the thrombus. These observers call attention to the fact that the cavernous sinus should not be regarded as inaccessible and that it can be reached by the temporal route, practically the same route which is employed in operations upon the Gasserian ganglion. Other methods have been reported, one by Bircher, another by Voss of Riga and still another by Grunert.

¹ Glasgow Medical Journal, 1904.

² Amer. Jour. Med. Sc., Feb., 1905.

Luc¹ aided by a series of experiments on the cadaver elaborated a method of approaching the sinus by the sphenoidal route. In his first attempt he made a large opening in the anterior wall of the maxillary sinus, resected almost its entire internal or nasal wall, and then uncovered and opened the anterior wall of the sphenoidal sinus. He then proceeded to make an opening in the lateral wall of the sphenoidal sinus, that is the part in relation with the sella turcica, with a view toward exposing the cavernous sinus. In every attempt to do this he failed, finding that the chisel or gouge which he was using punctured the bone either at the posterior or anterior clinoid fossa. He then determined to try to approach the cavernous sinus by a route through the maxillary sinus of the opposite side and in this he was successful. Neither the nerve trunks nor the carotid artery which are in such close relation with the cavernous sinus were injured. By making a large opening through the antrum of Highmore and by using a solution of adrenalin he believes that hemorrhage can be easily controlled. From his observations upon the cadaver this method of exploring the cavernous sinus seems to be perfectly practical. When the operation is to be performed upon a living subject, suffering from a thrombus of the sinus, the question arises as to whether or not it would be possible by this route to establish adequate drainage, and this question he answers in the affirmative. Thrombosis of the cavernous sinus is frequently either preceded or followed by thrombosis of the ophthalmic vein, and in such cases it might be necessary to either simultaneously or subsequently expose this structure also. Krönlein has already devised an operation for the exposure of the ophthalmic vein. While Luc has not yet had any experience with the living subject he believes that in the operation which he has devised for removal of the thrombus from the cavernous sinus, to be followed if necessary by the operation of Krönlein for the exposure of the ophthalmic vein, we have a successful method of treating this so frequently fatal a disease.

Pneumatocele of the Cranium. The term pneumatocele was first proposed by Chevance de Wassy. It may be defined as a gaseous tumor, observed almost always either in the mastoid or occipital region, or over the frontal sinus and forehead. It varies considerably in size, sometimes attaining tremendous proportions. Its origin is attributed to the escape of air from some air sinus, as the mastoid cells or frontal sinus, and it grows by dissecting the periosteum and overlying tissues up and away from the underlying bone. The shape and size are regulated chiefly by the attachments of the periosteum. Pneumatocèles may be differentiated from meningoceles from the fact that they do not pulsate. One of the characteristic features of the tumor is the queer sound which the patients

¹ *Annales de mal de la larynx de nez du Pharynx*, June, 1905.

hear, as of rushing air or water, in the ear if the tumor be occipital, and in the nose and throat if it be frontal. It is difficult sometimes to distinguish between a pneumatocele and an abscess, but the presence of a bony outgrowth or ridge around the margin of the tumor is a feature which is common only to pneumatocele. The exaggerated tympanitic note which one may elicit upon percussion over the tumor is perhaps the most characteristic and valuable diagnostic sign. While the clinical and pathological phenomena are thoroughly understood, there are some conflicting views with reference to the etiology. The question is asked, What causes the solution in the continuity of the bone which enables the air to escape from the underlying sinus? It is not likely, as Helle suggested, that the air or gas escapes through vascular bony foramina. Nor is it likely that the condition is due to congenital defects, because the tumor does not usually appear during the first decade of life. It is more reasonable to suppose that the establishment of a communication with the sinus through the bone is due either to traumatism or to inflammation. In the 33 cases which have been reported there were 10 which were traceable to direct violence; 10 to inflammatory processes. There are cases on record in which the establishment of communication was believed to be due to sudden violent efforts, which so increased the pressure as to make the bony wall give way. With this brief review of the subject McArthur¹ reports a case which came under his own observation and gives a synopsis of all the hitherto reported cases. Up to the present time these numbered 33, of which 23 were occipital and 10 frontal. In McArthur's case the tumor developed over the posterior inferior portion of the left parietal bone. The tumor presented all the characteristics of a pneumatocele, and at the operation, which was subsequently performed, after the tumor was incised and laid open a number of exostoses were found immediately underneath the scalp, and a fistulous tract was discovered leading to the external auditory canal. The entire wound was left open and packed with iodoform gauze, and subsequently the original cavity of the tumor became obliterated. It is interesting to note that in 1859 Costes, of Bordeaux, in his well-known memoir, arrived at conclusions which still hold true. They are as follows: 1. Pneumatocèles are very rare. 2. They always depend on perforations of the bony walls. 3. They are always tympanitic. 4. They are more or less reducible by pressure. 5. They can take their origin from the mastoid or frontal sinuses only. 6. They are of very slow and indolent formation. 7. They are never dangerous except from complications (infections).

The treatment of this condition consists in a free incision into the pneumatocele, with removal of the bony ridges at its margins; pressure and

¹ Journal of the American Medical Association, May 6, 1905

packing will cause obliteration of the cavity. The results of compression alone with aspiration and puncture have not been satisfactory.

Meninges. MENINGITIS. The operative treatment of acute diffuse suppurative meningitis has been, to say the least, most discouraging. Even so frequently fatal a disease as diffuse suppurative peritonitis is occasionally benefited by the evacuation of the contents of the peritoneal cavity and by the establishment of drainage, together with such important adjuvants as the abundant use of saline solutions. The difficulties with which the surgeon has to contend, and to which must be attributed in large measure the discouraging results of surgical intervention, are much the same with the meninges as with the peritoneum. Foremost is the difficulty in securing adequate and continuous drainage. The rapidity with which adhesions form between serous membranes and adjacent structures, not only between one serous membrane and another, but especially between the serous membrane and a foreign body, as the drainage material, is well known. These adhesions shut off the general cavity from the point at which drainage was established, and prevents that continuous evacuation of the infectious material by which alone surgical intervention can hope to be of any service. Then, again, the effect of the inflammation upon the structures themselves is a serious drawback. On the one hand, the intestines become paralyzed, distended, and their contents intensely toxic; while, on the other hand, the vital centres of the brain and cord are suffering from the extension of the inflammatory process. As Kümmell¹ points out, the results obtained by operation in cases of localized meningitis, as in cases of otitic origin, are very much better. Numerous cases have been reported in which patients have recovered after the establishment of drainage. But here we are dealing with a well-walled-off process, a circumscribed inflammatory process, which in its entirety can be laid bare and drained. Kümmell reports a case of diffuse meningitis, secondary to basal fracture, in which, after lumbar puncture and direct drainage, the patient recovered. An opening as large as a five-mark piece was made in both parietal bones, and a corresponding portion of the underlying dura was excised. Strips of gauze were introduced as far as possible into the posterior fossa, and the osteoplastic flap was replaced after removing enough bone to allow for the removal of the gauze. Gussenbauer believes the treatment of diffuse meningitis should be along surgical lines; but von Bergmann is of the opinion that those cases of diffuse meningitis which recover from operation are due to the staphylococcus pyogenes albus, not the aureus, and that these cases would do as well with lumbar puncture alone. Kümmell, on the ground that we are dealing with an otherwise hopeless disease, believes operation

¹ Archiv. f. klin. Chirurgie, Bd. lxxvii., Heft 4.

should be resorted to in every instance. The operation should consist in very liberal opening in the bone and in splitting the dura. The cavity is cleaned by irrigation or sponging and gauze introduced for drainage.

As reported by Alexander,¹ the treatment of octogenic meningitis at Politzer's clinic consists, after removal of the entire diseased focus, in exposure of the dura and drainage of the intradural space, together with aspiration of the fluid through this opening, and finally lumbar puncture. In cases of suppurative meningitis the dura is opened for a distance of 1.5 cm. to 5 cm., and sometimes counteropenings are made to provide for freer drainage. In two instances Politzer made a counteropening in the posterior fossa, behind the sinus, and in cases in which there is an existing encephalitis he goes so far as to suggest the advisability of removing the outer diseased layer of the brain.

Meningocele Spuria. This is so unusual a condition as to warrant brief mention of a case cited by Bayerthal.² The patient when first seen was twenty-four years of age, and the lesion was attributed to an injury (a fracture of the skull and laceration of the dura) inflicted by obstetrical forceps. During the period of greatest development—*i. e.*, in the first three years—a diastasis took place between the edges of the fractured bone and cerebrospinal fluid made its escape beneath the scalp. The continuous growth of the brain exerts sufficient pressure to cause asymmetry. Later in the course of the disease the surface of the protrusion sinks in. In only a few cases has perforation of the scalp been observed. The sac of the meningocele communicates with either the subdural or arachnoid space or with the ventricle. There is usually a very active pulsation in the meningocele, and continuous pressure upon it will be followed by signs of pressure symptoms. An interesting observation was made upon the effect of this increased intracranial tension upon choked disk. Continuous pressure was made over the protrusion, and the ophthalmoscope revealed a slight dilatation of the retinal veins and increase of the venous pulse, thus bearing out the theory of Sängér. The cerebral symptoms of meningocele spuria depend of course upon its site. If in the parietal region, the clinical picture will resemble exactly that of infantile paralysis. This was the case in Bayerthal's patient. As to the prognosis, there is in infancy the danger of meningitis and in adults the danger of epilepsy. The damaging effect of the meningocele upon the brain is very much more apt to make itself manifest at an age when greater demands are made upon the psychic and mental strength of the individual; that is, in adult age rather than in childhood.

¹ Deutsche med. Wochenschrift, Bd. xxxi., No. 39.

² Centralblatt f. die Grenzgebiete der Medizin und Chirurgie, 1905, No. 17.

Angioma of the Meninges.—The patient, who was suffering from an infantile hemiplegia, had a very extensive naevus over the left side of the face, including the forehead, half the nose, the left ear, and the cheek. The patient died from some intercurrent affection and at the necropsy Strominger¹ found that, on the affected side, the meninges were considerably thickened and unusually vascular, and presented the same lesion which existed on the face. The underlying hemisphere was very much smaller than that on the opposite side and the fissures were poorly developed.

Encephalomeningocele. Only because of the tremendous proportions of the tumor is the case of encephalomeningocele reported by Haggard² of any special interest. The child weighed but six pounds and the tumor five pounds. The child died as a result of infection the ninth day after the operation.

Cerebellum. TUMORS. Not very long ago there was a wholesome dread of invading the cerebellar fossa in the search of tumors or cysts. This was due in part no doubt to the fact that operation was resorted to only as a last resort, when the patient's vitality was at a low ebb, and the results were anything but encouraging. We are in the midst now of what might properly be called a "revival" period, in so far as concerns the surgery of the whole nervous system, central and peripheral, and a great deal of attention and serious thought is being devoted to the solution of the problems that have seemed in the past insurmountable and to the correction of those mistakes which did so much to discredit this field of surgery. This revival of interest in cranial surgery may be attributed to a number of factors; in the first place, during the last few years the physiologists have been conducting experimental work in connection with the function of the cerebellum and the information derived from this source has been of assistance to the clinician in the localization of cerebellar lesions. Then, again, the technique of the operation for exposure of cerebellar lesions has been greatly improved; through very much more liberal openings than were made in the past, the possibility of exposing the tumor is proportionately increased. I find in the literature of the past year a number of interesting contributions upon this subject. Warrington,³ in his review of a series of clinical papers on cerebellar tumors, prefaces his remarks with the following statement: "A valuable series of papers by American neurologists has just been published dealing with the diagnosis and treatment of cerebellar tumors, and it may be admitted that the opinion often held that these tumors are inoperable can no longer be accepted. Increased precision in diagnosis and local-

¹ Spitalul, 1905, No. 6.

² Medical Record, June 10, 1905.

³ Medical Chronicle, June, 1905.

ization have led to bold and more radical operation, which has been justified in not a few instances by successful results."

One of the most notable contributions to this subject, because of the thoroughness with which the authors have entered into the study of the subject, and because the subject has been treated from every standpoint, is a brochure¹ containing articles by Mills, de Schweinitz, Weisenburg, Lodholz, and Frazier, treating of the diagnosis, the ocular symptoms, the pathology, the functions, and the surgical aspects of tumors of the

FIG. 2



Vertical section of head, showing the comparatively small cavity in which the cerebellum is contained and its inaccessibility. Note the distance between the cerebellum and the cutaneous surface; note also the angle of the tentorium and the position of the lateral sinus.

cerebellum. This contribution contains also the records of six cases which were operated upon at the University Hospital during 1903-04. It is only appropriate here to review so much of the brochure as refers to the surgery of this engrossing subject. Referring to the anatomical considerations, I have called attention to the natural anatomical difficulties which are encountered in operations upon tumors of the cerebellum, particularly the position of the lateral and occipital sinuses, the plane of the tentorium cerebelli, the proximity of the operative field to so vital a structure as the medulla oblongata (Fig. 2). Even when

¹ Reprinted from the New York and Philadelphia Medical Journal, February 11 and 18, 1905.

one has removed a considerable portion of the skull below the superior curved line, there will be exposed to view a small portion of the gross area of the cerebellum; neither the upper nor the anterior nor the mesial surface will be exposed to view by this procedure. The limited space in which the cerebellum is contained further hampers the manipulations necessary either for exposure or removal of the tumor. These difficulties, together with the fact that the cerebellar hemispheres are compressed in a relatively smaller space than the hemispheres of the cerebrum, and are under such tension that when the dural flap is reflected the cerebellar tissue almost invariably protrudes through the opening, make the exposure of tumors a relatively difficult procedure. In my operations I have noted a number of anomalous conditions in the distribution of tributary sinuses. Some of these are of sufficient size to cause profuse and alarming hemorrhage.

The indications for operation in case of suspected tumors of the cerebellum do not differ materially from those which have been endorsed in the treatment of tumors of the cerebrum. In both classes of cases, once the diagnosis has been made, operation, if it is to be performed at all, should not be delayed. Postponement of operation should be discountenanced if for no other reason than because in cases of long duration patients with tumors of the cerebellum, as a rule, are poor subjects for operative intervention. I have called attention elsewhere to the results obtained in palliative operations in tumors of the cerebrum. If any comparison can be made I believe that the results to be anticipated are even greater in tumors of the cerebellum than in those of the cerebrum. The headache, vertigo, and vomiting, so constant in cerebellar tumors, make the life of the patient pitiable; and yet he may be relieved of all these symptoms for a considerable time by the adoption of a comparatively simple procedure. The most striking effect of these palliative operations is the rapid subsidence of the choked disk and the correspondingly rapid restoration of vision. Perhaps the strongest arguments against delay of operation is the possibility of being able to save the patient's eyesight.

As to the operative technique every measure should be adopted to control, as much as possible, the always profuse hemorrhage, and to this end the head and shoulders should be elevated. The incision begins at the tip of one mastoid process, and running parallel with and 1 cm. above the superior curved line extends to the median line, at which point a vertical incision is made downward to enable one to reflect a flap sufficient to expose the field of operation. When the flap, including the periosteum, has been reflected, hemorrhage may be alarmingly profuse from the numerous tributary veins that penetrate the occipital bone. The patient may lose so much blood before the bleeding can be

controlled that it may be advisable in certain instances to put off the remaining steps of the operation until the patient has recovered from the attending shock. As Krause and Schede have already pointed out, it is unnecessary, owing to the thickness of the muscular flap, to preserve the overlying bone; the latter is removed with chisel and rongeur forceps until an opening is made extending upward to a point above the lateral sinus, outward as far as one can go without opening the mastoid cells, inward to within a centimetre of the median line, and downward to at least 1 cm. distant from the foramen magnum. When the dural flap is reflected, exploration for the tumor must be conducted systematically and rapidly. Attention is called to the impunity with which the cerebellar hemisphere can be freely incised without the risk of functional disturbances, and also to the impunity with which a considerable portion of the hemisphere may be removed without increasing materially the dangers of operation.

Exposure of the Cerebellopontile Angle. In those cases in which the growth is believed to be situated at the cerebellopontile angle it may be necessary to resort to one of two methods to bring the tumor into view, either to remove a portion of the hemisphere or to puncture the ventricles. The latter procedure is in itself attended with such grave dangers that it cannot be endorsed. A number of fatal cases have been reported in which to relieve pressure the lateral ventricle was tapped. In those cases in which it is necessary to expose the cerebellopontile angle I advocate the removal of a portion of the cerebellar hemisphere. The danger of exerting undue traction or pressure upon the pons or medulla in attempting to expose or remove tumors is more to be dreaded than any other stage of the operation. Reference was made in the March, 1905, issue of *PROGRESSIVE MEDICINE* to the case reported by Woolsey, in which he was convinced that the death of his patient three hours after operation was due to the hemorrhage in the pons, caused by the traumatism attending the manipulations. The shortest route to the cerebellopontile angle lies along a line running parallel with the petrous portion of the temporal bone (see Fig. 3). This is the route which should be followed not only because it is the shortest, but the safest, in that the manipulations are carried on at a point farthest distant from the pons and the medulla.

It is appropriate to speak in this connection of the accessibility of the fifth and eighth nerves on the posterior surface of the petrous portion of the temporal bone. On exposing the posterior plane of the petrous portion of the temporal bone one brings into view the fifth, seventh, and eighth nerves (see Figs. 3 and 4). These three nerves are quite accessible, and in my cerebellar operations I have always been able to expose them, when in search of tumors in the cerebellopontile angle.

While there is no conceivable occasion for operative attack upon the seventh nerve within this fossa, the possibility of dividing the root of the fifth nerve for the relief of trifacial neuralgia suggests itself, and the division of the eighth nerve for persistent tinnitus aurium has been recommended and already practised by Krause.

FIG. 3

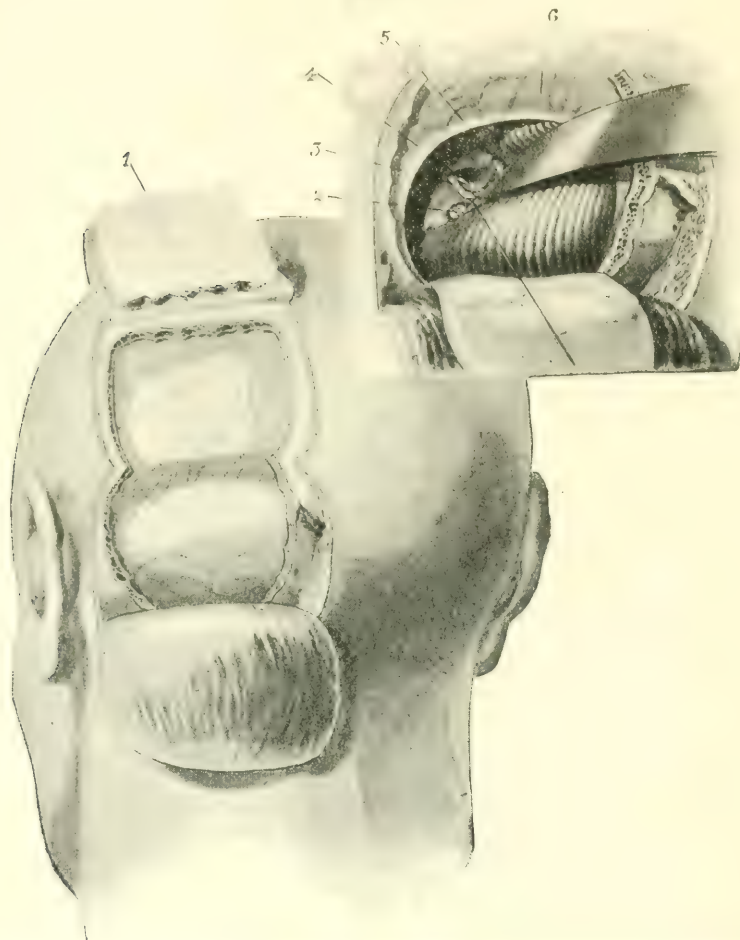


Photograph of a horizontal section of the head cut on a level with external auditory meatus; *a*, representing a point at the cerebellopontile angle; *b*, the auditory nerve entering the internal auditory meatus; *c*, *d*, *e*, three points on the skull. Note the distance between point *a*, and the points *c*, *d*, and *e*, as illustrating the shortest route to the cerebellopontile angle respectively. The shortest distance from the skull to the angle is measured along a line drawn between *a* and *c*. The farther away from *c* or the nearer to *e* the greater will be this distance.

The difficulty in localizing cerebellar tumors as to one side or the other is well known to all clinicians. Occasions arise, therefore, in which it may be necessary, on failing to find a lesion on the side first exposed, to proceed to the exposure of the opposite side. The simultaneous exposure of both hemispheres is a questionable procedure. It is a better

plan to allow an interval of time to elapse between the exploration of one side and that of the other. There are no very great technical diffi-

FIG. 4



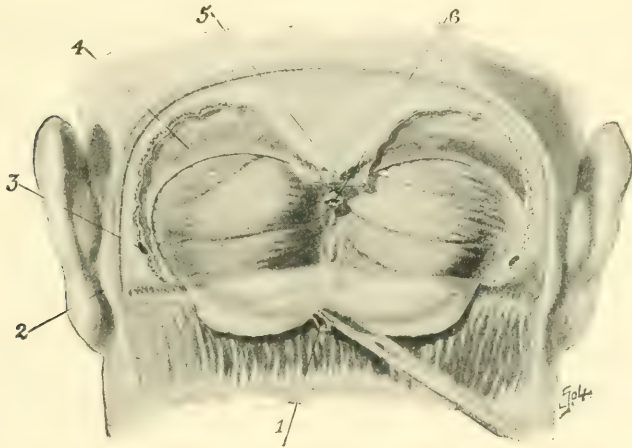
The larger figure to the left illustrates the operation for the combined exposure of one cerebellar hemisphere and the occipital lobe of the cerebrum. The smaller figure, above and to the right, illustrates the structures in relation to the anterior aspect of the cerebellum and the petrous portion of the temporal bone. Attention is called especially to the position of the fifth, seventh, and eighth cranial nerves. This drawing was made by viewing the structures from the lateral aspect, such an exposure as would be made in exploring for tumors of the cerebellopontile angle. 1. Osteoplastic flap reflected in an operation for the combined exposure of occipital lobe and cerebellum. 2. Ninth, tenth, and eleventh cranial nerves. 3. Auditory nerve drawn to one side by retractor in order to expose 4 the facial nerve which lies directly beneath it. 5. The root of the trigeminus as it enters the groove at the apex of the petrous portion of the temporal bone.

culties, however, associated with the operation, an illustration of which is seen in Fig. 5, as it was performed by myself upon the cadaver. It is

necessary to remove the overlying bone, preferably with a gigli saw, and to ligate the superior longitudinal sinus in order to be able to reflect the dural flap. I am not prepared to endorse this operation as a routine procedure, but believe it should be restricted to those cases in which the tumor occupies a position near the mesial surface.

Results. In the series of six cases which came under my observation, one died after the first stage of the operation, one recovered after the removal of the tumor, and one after the evacuation of a cyst. In one the tumor was removed successfully, but eventually recurred; another was considerably improved after a palliative operation, and in one there was no improvement after the exploration on one side, and the patient

FIG. 5



Operation for the simultaneous exposure of both cerebellar hemispheres necessitating ligation of the occipital sinus. 1. The occipital sinus, which has been ligated previously and reflected with the dura. 2. Mastoid process. 3. A large tributary of the lateral sinus, invariably opened in cerebellar craniectomies and of varying dimensions, said to be sometimes as large as the lateral sinus. 4. Lateral sinus. 5. Occipital protuberance. 6. Occipital sinus.

refused to give consent for further exploration. My experience with this series of cases leads me to believe that the dangers attending these operations have been exaggerated. That there are dangers we must admit; and the dangers peculiar to this operation are the proximity of the field of operation to the medulla and to the pons, and in the traumatism to which they may be subjected. Only in the avoidance of every possible source or degree of traumatism to these sensitive structures can surgeons hope to obtain better results. It is appropriate at this juncture to refer to the views expressed by Borchardt,¹ in connection with the report of the

¹ Berliner klin. Wochenschrift, 1905, No. 33.

death of a patient from whom he had removed a tumor from the cerebellopontile angle. He attributes the death of the patient, which occurred twenty-six hours after the operation, to pressure upon the medulla oblongata, which was brought about by the introduction of a tampon to control bleeding, and by the presence of a large blood clot. Owing to the fact that in each instance the patient's condition failed rapidly, it was necessary to perform the operation in three sittings. He went so far as to chisel away the mastoid process and to remove the labyrinth, thus exposing the greater part of the transverse and sigmoid sinuses. The petrous bone was also removed up to within a centimetre of the internal auditory meatus. The sigmoid sinus was divided between two ligatures. The tumor, a fibrous sarcoma, was found in the cerebellopontile angle, and its removal was attended with a good deal of hemorrhage. In reviewing the technique of the operation, he calls attention to the fact that in order to expose the cerebellopontile angle it is not necessary to remove the labyrinth or to divide the sinus.

I have been struck with the comparatively slight depression that follows the operation, and with the rapidity with which reaction ensues. I have also noted that the gravity of the operation itself does not seem to be affected by the act of removing the tumor, or in removing a section of cerebellar tissue for better exposure; whether the operation was solely exploratory, palliative, or whether the tumor was found and removed, the effect upon the patient was the same.

I have collected 116 cases of operation upon the cerebellum, from which the following statistics were compiled:

	Per cent.
Tumors found	45
Tumors not found	55
Removal with recovery	15
Removal with improvement	13.9
Removal without improvement	0.9
Improvement without removal	13.9
No improvement without removal	13.9
Death when tumor was removed	12.9
Death when tumor was not found and not removed	28.7

The following table gives a comparison of the statistics of successive dates, showing an increase in the percentage of recoveries and improvements and a reduction in the mortality:

Results.	Frazier's table —1904, per cent.	Duret's table —1903, per cent.	Oppenheim's table —1902, per cent.
Recovery	15	14	7.5
Improved	28	25	7.5
Unimproved	15	..	13
Mortality	42	60	71

The next table gives a comparison of the statistics of total number of cases in Frazier's collection with the statistics of the last five years, showing a manifest improvement in the results:

Results.	Total number of cases—per cent.	Cases reported during past 5 year.—1899–1904, per cent.
Recovery	15	24
Improved	28	28.5
Unimproved	15	11
Mortality	42	35.8

CEREBELLOPONTILE TUMORS. To those who are especially interested in tumors taking their origin in the groove between the pons and medulla I would refer them to an article by Funkenstein,¹ which contains a very complete review of the symptomatology of this affection. Many of these tumors are neurofibromata and are associated with a more or less extensive central neurofibromatosis. It is only when they are solitary and unilateral that operation is justifiable. A very valuable diagnostic sign is the presence of deafness on one or both sides. When deafness is bilateral it is probable that there is a tumor on both sides, and also a central neurofibromatosis. While these tumors are of very slow growth, they are ultimately fatal. It is unfortunate that the operation for their removal should be attended with such a high mortality, since there could exist no more favorable lesion from the standpoint of its pathology for operative intervention. The tumor is usually solitary, not adherent to surrounding structures, takes its origin from the auditory nerve, and is absolutely benign. If the patient survives the operation the prognosis is most favorable. The relief should be both absolute and permanent.

REMOVAL OF ALMOST AN ENTIRE CEREBELLAR HEMISPHERE. At a meeting of the University of Pennsylvania Medical Society I² presented a patient from whom I had removed at different times almost one entire hemisphere. Many interesting problems present themselves for discussion in a human subject from which so much of the cerebellar tissue had been removed. The patient, a little boy, had been under observation a little over a year, during which time three operations had been performed. At the first the tumor was not found, but in order to relieve pressure one-third of the normal cerebellar tissue of the left hemisphere was removed. At the second operation the tumor, a glioma, was found and removed; and at the third a large recurrent growth was extirpated. One of the most interesting features of the case from the clinical point of view is the comparative impunity with which so large a proportion of the cerebellar hemisphere may be removed. In this, as in other cases

¹ Mitt. a. d. Grenzgebiete f. die Med. u. Chirurgie, Bd. xiv., Nos. 1 and 2.

² University of Pennsylvania Medical Bulletin, February, 1905.

which have come under my observation, not only has there been no marked shock or depression attending the operation, but no demonstrable disturbance of function, and the results, in so far as the relief of symptoms was concerned, were most striking. In this particular case the headache, choked disk, and vertigo subsided very rapidly after each operation, and the patient always reacted promptly, and in no instance, save one, and then only for a short time, was I concerned about his immediate recovery.

Cerebellar Abscess. Griffith¹ reports a case of cerebellar abscess following a blow upon the head in the occipital region, with no lesion apparent at the time other than a lacerated wound of the scalp; later, however, symptoms suggestive of cerebellar pressure developed. About two weeks after the injury the wound was explored and the occipital bone was trephined. There was no visible pulsation; an exploratory needle was introduced, and an abscess containing some three ounces of pus was found. The abscess was evacuated and the convalescence was uninterrupted. There is nothing of unusual interest concerning the case, with the exception of an incident which occurred during the early stage of the operation. The patient, a little child, suddenly stopped breathing; artificial respiration was performed and continued for a half hour before breathing became again regular. Meantime the pulse beat was regular in time and rhythm. These sudden attacks of respiratory failure are not infrequent phenomena in patients suffering with the cerebellar lesions. While at first thought one attributes them to pressure upon the respiratory centre in the medulla, this does not explain to my mind the sudden and unexpected character of the onset and the occasions in which patients survive the attacks. It is this complication which the surgeon dreads in operating upon patients with cerebellar lesions, because it comes when least expected, and may determine, through no fault or error on the surgeon's part, a fatal termination. I have seen this complication occur during operation, as in Griffith's case; I have seen it occur a week after the performance of a palliative operation for cerebellar tumors, and I have seen it occur while patients were awaiting operation. Only recently I had under my care a patient who was about to be operated upon, and just before the patient was brought to the etherizing room an attack of respiratory failure came on, which terminated fatally. It was a fortunate coincidence. The attack might have occurred a few minutes later, and the patient died during the administration of the anæsthetic or upon the operating table.

Cerebral Tumors. Attention has been called during the past year on several occasions to the *surgical aspects of tumors of the brain*. The matter was very freely discussed at the meeting of the American Neuro-

¹ Scottish Medical and Surgical Journal, May, 1905.

logical Association, and we have been fortunate in having presented to us in a very concise form the experience of a number of surgeons with cases which have been treated in the Boston Hospitals. This report appeared in the *Boston Medical and Surgical Journal*, July 20, 1905. In reviewing their discussions and the reports which have been made upon this subject I will call attention to the following points:

First, as to the operability of brain tumors. From the statistics which are given below, it will be seen that the percentage of cases which from the autopsy records were believed to be operable is extremely low. Seidel gives an estimate of 3 per cent. and Walton of 4 per cent. From these figures alone it would appear that the field for surgical intervention in brain tumors was a very limited one, and while this may be true, it should not be used as an argument against an exploratory operation. The latter is a procedure which in itself is comparatively free from danger, and if, as it would seem from the estimates, which are to say the least conservative, there is but one chance in twenty-five of finding a tumor which can be removed, the patient should be given the benefit of the doubt. To me one of the most interesting features of the reports which have been made has been the autopsy findings with reference to the situation of the tumors. Those which were operable either took their origin from the dura itself or were purely cortical tumors; in each instance they were visible to the eye of the surgeon as soon as a dural flap was reflected. Of the tumors which were not situated in either of these positions the greater majority were so situated that they would not have been exposed by the usual exploratory incision or puncture that is made in the cortex.

The second point to which I desire to call attention is the indication for operation even in cases which are believed to be before operation, or subsequently found to be, inoperable. For the past three years I have at the University Hospital been practicing the so-called "palliative" operation for brain tumors, and only recently my attention was called to a patient upon whom I performed a palliative operation because the tumor could not be found. The patient suffered intensely from headache of an agonizing type and there was very marked choked disc. The latter was of so long duration that the optic nerve had become atrophied and therefore the patient was irremediably blind. His headache however was entirely relieved and has remained so for the past three years, simply by the removal of a section of bone from the parietal region on both sides. I have had other cases in which the effects of the palliative operation have been equally satisfactory. Codman even goes so far as to suggest that we should be satisfied in every case with a purely palliative operation, abandoning the attempt to perform a radical one. This seems to me an opinion which is scarcely warranted by the results

of our operative experience. Even in a palliative operation one would explore a considerable region of the brain, and if the tumor is exposed at the site of operation its removal would in most instances not increase the operative risks. It seems to me therefore that we should in every instance, unless there is some grounds for believing the tumor to be inaccessible, make our opening at such a point as to expose the region where it is believed the tumor is situated; then in case of failure to find the growth the operation may be concluded as a palliative one, and no further intervention will be required. Should, however, the tumor be exposed, the patient should be given the benefit of the possible cure or at least the greater relief which would follow its removal.

Generally speaking, those who entered into the discussion of this subject at the meeting of the American Neurological Association were in favor of operative intervention. Starr took the ground that, inasmuch as brain tumors are absolutely hopeless without operation, the patient should be given the benefit at least of the results that have been obtained from a palliative operation, but he adds, these operations should be undertaken by those who have made this field of surgery the object of special study and investigation, and in the case of his advising a patient to submit to an operation, he does so with the understanding that a surgeon will be selected whom he knows has had special training in this field.

There is little to be said with reference to the operative technique that has not already been alluded to in previous issues. The point that Starr has taken with reference to the necessity for special training in this field of surgery is I believe a good one, and there is to my mind not the slightest doubt but that the greater the number of operations performed by those who have made this the subject of special study, the better will be the results.

OPERABILITY OF BRAIN TUMORS. In many of the operations performed for brain tumor, in which the surgeon has failed to find the lesion, a great deal of valuable information may be obtained from the autopsy reports. The estimates of the operability of brain tumors based upon autopsy cases collected by Knapp in 1898 varied from 3 per cent. (Seidel) to 17 per cent. (Dana). Walton has collected from the records of a number of hospitals and private collections records of 374 cases, and of these he estimates that 7.5 per cent. were operable, 79.4 per cent. inoperable, and 13.1 per cent. doubtful. He further found that eliminating cases of further infection, and the cases in which there were no symptoms, the operable cases were still further reduced to 4 per cent. In this record he found a number of operable endotheliomata near the median line and under the frontal lobe without any localizing symptoms whatsoever. The lesson to be learned from this fact is that one should extend the field

of exploration, particularly in the direction of the frontal lobe, rather than puncture the brain in search of deep-seated, removable tumors, which autopsies show to be practically wanting. In classifying these cases he included in the operable ones, the primary, accessible, well-defined tumors which can be removed without cutting into the brain tissue. In the great majority of cases these tumors spring from the dura. Those tumors involving the deeper structures of the brain, those tumors of multiple growth, as well as those with wide metastasis should be placed in the inoperable class. In the doubtful class he includes gliomata and non-encapsulated sarcomata in accessible regions, and cysts in which operations can only evacuate the contents.

In searching the records of the Massachusetts General Hospital, Codman found that there had been 36 cases operated upon for brain tumor; in twenty-eight of these a radical operation had been planned; seven died, in eleven there was no improvement, seven some improvement, and three were not traced. Of the eight palliative operations which were performed, in four the patients died within two weeks, in two there was no improvement, and in two the patient could not be traced. In discussing the records and results of these cases Codman makes the following observations: that the use of iodide of potassium as a diagnostic measure should not be relied upon since in at least eight of the series, in which the operation failed, the resort to the therapeutic test had caused a delay of from several weeks to many months; in three of the series death was due to shock and hemorrhage and other causes which were not immediately fatal. Considerable difficulty was experienced with bleeding, and at the end of the operation the patient's condition was critical. Attention is called therefore to the importance of adopting all measures preventative of shock and hemorrhage. An unusually large proportion of cases died from sepsis, and Codman believes that the two-stage operation may be partly responsible for this large percentage of cases. Of eleven cases in which there was no improvement, eight had an increase of paralysis or aphasia developed after the operation, and all of these had a hernia cerebri. The most important conclusion which he draws from his observations is as to the advisability of attempting to perform a radical operation. He rather inclines to the belief, taking into consideration the number of failures to find the tumor, the high mortality, the number of cases in which there is no improvement, and the large percentage of cases which are found by the autopsy records to be inoperable, that we should be satisfied with a purely palliative operation. Lumbar puncture has not proved a satisfactory method of relieving intracranial tension, since of the four cases in which this method was adopted two cases died. It would be of interest to surgeons to know that in none of these series was any good accomplished by explora-

tion of the brain tissue itself by means of incisions and explorations with probes or aspirating needles, unless there was some indication of the existence of a cyst or of a tumor on the surface of the brain itself.

In the records of the Massachusetts General Hospital and from his private records, Lund found six cases of cerebral tumor and four cases of tumor of the cerebellum. Of the six cases of cerebral tumor three died from the operation, and in one the operation was performed after the general symptoms had progressed to a very grave extent. In two the autopsy showed the presence of inoperable lesions, which would necessarily have soon proved fatal without operation. In one of the two remaining cases which survived the operation, the tumor was not found. In one of them it was found and removed with relief of symptoms. Of the three *cerebellar* cases of which he was able to find a record, all proved fatal, two of them were operated upon after the symptoms should have indicated exploration, and in one of these the tumor could have been successfully removed. In the third case the tumor had existed for a long time and was of considerable size; it arose in the pons and only secondarily involved the cerebellum, obstructing the aqueduct of Sylvius and causing internal hydrocephalus. He is of the opinion that there is a more hopeful outlook for tumors of the cerebellum than for tumors of the cerebrum. Increasing attention to the diagnosis and greater confidence in the technique will he believes lead to better results. The operation should no longer be regarded as a *dernier ressort*; it will in many cases offer considerable relief and perhaps cure a few.

A FEW ISOLATED CASES OF BRAIN TUMOR. In the case reported by Thurston¹ the skull was opened over the area of tenderness, but apart from an evidence of increase in intracranial pressure, nothing abnormal was discovered upon the exposed area of the cortex. Immediately after the operation the patient was relieved of his headache but died on the fifth day. At the autopsy a *gliosarcoma of the caudate nucleus* was found growing, projecting into the frontal lobe. The increased intracranial tension was evidently due to the distention of both the right and left ventricles.

The tumor which Keen found² was a large infiltrating *sarcoma of the left frontal lobe* involving the orbit and the frontal sinus. An unusually large osteoplastic flap was reflected and as much of the tumor was removed as possible. The large cavity which was left by the removal of the tumor and a great deal of débris was packed with iodoform gauze an opening having been made at the edge of the bone flap for drainage.

¹ Indian Medical Gazette, August, 1905.

² Journal of the American Medical Association, March 11, 1905.

The tumor recurred rapidly, and the patient died six weeks after the operation.

A successful operation for the removal of a brain tumor is reported by Jeannel.¹ The patient had been ill for about a year and at the time of the examination he presented symptoms which pointed to a tumor in the region of the pre-central or first *frontal convolution*. At the operation the tumor, a psammoma of the size of a hen's egg, was found in this situation and removed. The patient recovered from the operation and has remained free from any signs of recurrence for a period of about a year. He was relieved of all the symptoms from which he had been suffering, save the blindness which was the result of an optic neuritis. His health however was not entirely restored but it was believed that he was suffering more from hysteria or from a traumatic neurosis rather than from any recurrent growth.

In a case in which Bordhardt had removed a tumor from the *right frontal lobe*, the patient suffered from a severe psychosis with dementia for almost a year. He recovered, however, entirely from this and Friederich² who examined him over four years after the operation reported him entirely well.

Owens presented to the Chicago Surgical Society the report of a case in which he had operated and found an encapsulated *spindle-cell sarcoma in the region of the Rolandic fissure*. The tumor spread out over the dura for a short distance and was penetrated by some sharp fibres from the skull. The skull was hypertrophied and its unusual thickness rendered the operation somewhat difficult. In addition to the localizing symptoms the patient had the usual signs of intracranial pressure, vomiting, headache and choked disc. The two former were relieved by the operation, but the latter persisted, so that vision was not restored. The patient recovered from the operation. During the convalescence hernia cerebri developed and the protruding part was replaced within the skull and retained there with a gold plate.

CEREBRAL SKIAGRAPHY. Pfahler³ has for a number of years been working at this problem. He made a good many observations on the cadaver and some on the living subject. He found in his work upon the cadaver that he could almost invariably reproduce in the skiagraph the shadow of a tumor which he had for the purpose of his experiments placed in the different regions of the brain. He has been successful in some instances in demonstrating the presence of a growth in the brain of a living subject. With regard to the reliability of this procedure,

¹ Archives méd. de Toulouse, 1905, p 301.

² Zentralblatt für Chirurgie, No. 30, 1905, p. 22.

American Journal of the Medical Sciences, December 1904.

he says that he would not care to take the responsibility of recommending an operation on the brain purely upon skiagraphic evidence.

THE EFFECT OF LUMBAR PUNCTURE UPON CHOKED DISC. One of the immediate indications for the performance of a palliative operation in the treatment of tumors that either cannot be localized or cannot be removed, is the presence of a marked choked disc. The effect of the palliative operation, which consists in the removal of a considerable portion of the cranium and perhaps a part of one or the other cerebellar hemisphere, upon choked disc has been recognized for a long time, and the relief afforded is striking. Flatau¹ reports a case in which he practised upon a patient with symptoms of cerebellar tumor, lumbar puncture seven different times in the course of six months. Complete retrogression of the choked disc followed, but in the course of a few months the symptoms recurred and the patient died. The necropsy revealed a small-cell glioma in the left cerebellum. I have at other times and in other places commented upon the danger of lumbar puncture, especially in the presence of cerebellar lesions. Flatau recognizes the fact that it has been in some hands a dangerous procedure, but goes on to say that if it is practised exactly in the way that Quincke prescribes there is practically no risk. I do not believe that any method removes all the dangers of lumbar puncture in cerebellar tumors, and for this reason, particularly, would not endorse a procedure when carried out for the relief of symptoms, which respond so satisfactorily to the "decompressive" operation. Lumbar puncture has to be repeated on a number of occasions and the more frequently it is repeated the greater will be the risk.

Cholesteatoma. The true cholesteatoma is a very rare lesion, and differs in its etiology and many other respects from the so-called pseudo-cholesteatomata, which owe their existence to an otitis. The comparative infrequency of the true as compared with the false is proven by the figures of Grossmann's clinic, in which out of 578 cases of cholesteatoma but 1, or possibly 2, were of the real tumor type. As to the etiology, the congenital theory is the one now commonly accepted. Bennecke's statement, that the cells of cholesteatomata are of an endothelial nature, has been disproven by a number of observers. These pearly tumors are situated most frequently at the base of the brain inside the pia. They may be either on the under surface of the cerebral or cerebellar hemispheres, near the middle or to the outer side of the median line; occasionally they are found in the ventricles themselves, and, more rarely still, embedded in the cerebral tissue. Owing to their inaccessible position and uncertain symptomatology, it would seem that these tumors were

¹ Münchener med. Woch., April 4, 1905.

of more interest to the pathologist than to the surgeon; and yet one finds in reviewing the literature some cases in which there were distinct symptoms of tumor present, and some in which the tumor could have been removed. This is particularly true of Pfannemüller's case (von Bergmann, *Hirn Geschwülste*, p. 380), and also of the case of Benda. There is no definite way, of course, of distinguishing a cholesteatoma from any other tumor of the brain, although one's suspicion might be aroused, if there is a history of an uncommonly long period of development. Still less frequent are the cholesteatomata involving the cranial bones. Blecher was able to collect only 5 cases. They run a course very similar to a slowly growing central osseous tumor, which leads eventually to perforation and to fistulous tracts. Even less frequent than the endosteal tumors are those which take their origin from the dura. Their symptomatology corresponds to that of an intracranial tumor.

At the Thirty-fourth Congress of the Deutsche Gesellschaft für Chirurgie, Borchardt¹ reported a case of cholesteatoma in an individual who a year previously had suffered, as a result of a fall, a mild contusion of the brain. After the accident headache persisted, and later on there was some tendency toward vomiting and diminution of vision. Upon further examination it was found that there was a bilateral choked disc, some ataxia, a tendency of the body to fall to the left, some nystagmus, and marked pain on pressure over the left occipital bone. Upon removing the overlying bone a large cholesteatoma was exposed and removed. It had exerted considerable compression both upon the left cerebral and cerebellar hemispheres, and after its removal the symptoms entirely disappeared. It is important at these operations to remove the capsule, otherwise, by a proliferative process starting in the capsule, the tumor will be regenerated.

In Borchardt's case it was evident from the size of the tumor that it must have existed for at least ten years. It seems almost incredible that the brain could be subjected to such tremendous compression without exhibiting the slightest disturbance. Such a state of affairs can only be explained by the unusually slow and gradual increase of pressure. The first manifestations of any cranial lesion in the Borchardt case followed shortly the injury to the head. This injury no doubt caused a hemorrhage into and sudden increase in the size of the tumor. The brain had accustomed itself to the slow growing tumor, but, when its volume was suddenly increased by hemorrhage, signs of intracranial tension appeared. This is no doubt the explanation of the relation of cause and effect between trauma and the development and recognition of these tumors.

Cerebral Abscess. Although it has been said by Sir William MacEwen "that an uncomplicated cerebral abscess whose position is clearly

¹ Archiv f. klin. Chirurgie, Bd. lxxvii., Heft 3.

localized, if surgical measures are adopted for its relief at a sufficiently early period, is one of the most hopeful of all cerebral affections," it should also be said that, for one reason or another, the great majority of cases terminate fatally. In a series of 52 cases collected by Young¹ only 3 did not end fatally. That there is much to be learned yet of the symptomatology of this condition might be deduced from the fact that less than half of the total number of this series were accurately diagnosed. Abscess of the brain is a condition seen more frequently by the otologist than the general surgeon, because the majority of cases are secondary to an infectious process beginning in the middle ear. In Young's series of 52 cases 33 were attributed to chronic otitis media. Two-thirds occurred in the first two decades, and the temporosphenoidal lobe was the seat of the abscess twice as often as the cerebellum. Traumatism was responsible for only 3 cases, and diseases of the lungs (gangrene, empyema, abscess, and tuberculosis) for 5. In 1 case the abscess developed in the side opposite that of the primary infectious focus. In this very admirable paper Young discusses the symptomatology of brain abscess, and formulates the following set of rules, which may serve as a guide to the treatment: The first is that as soon as a patient with a history of ear disease, or of injury to the head, or of pulmonary or pleural suppuration presents symptoms pointing to the existence of a cerebral trouble of which the natural termination is death, the skull should be trephined, and if the meninges be healthy the brain should be explored. The symptoms he would select as being of this lethal nature are severe headache or a disturbed mental condition or optic neuritis, in combination with any one of the following: convulsions of the whole or part of the body, including opisthotonus and retraction of the head; an intermittent and infrequent pulse, with a normal or subnormal temperature; or, on the other hand, a high temperature, with a relatively infrequent pulse; and lastly, distinct paralysis, especially a dilated and inactive pupil on one side. To this group he is inclined to add a well-marked Babinski's sign. The second rule is, and this refers only to patients with otitis media, that after exploration of the temporosphenoidal lobe on one side, if pus be not found, no fear of shock should prevent the exploration of the cerebellum. Even if the respiration ceases the operation should be continued. For this accident happened on one occasion, but artificial respiration was performed, the cerebellum explored, and pus evacuated, when natural breathing began again at once. Moreover, two other patients died because the temporosphenoidal lobe only was explored; whereas the abscess was in the cerebellum. Should pus still not be found a similar operation must be done on the opposite side of the skull.

¹ St. Bartholomew's Hospital Reports, 1904, vol. xl.

But there are certain cases in which, after all this is done, an abscess is still undiscoverable, and it is evident that unless the symptoms be relieved by the mere act of trephining, as sometimes happens, the patient will die from the increasing cerebral compression; and to relieve this it would appear reasonable to puncture the lateral ventricle by passing a trocar inward and upward just above the lateral sinus and draining the cavity. The third rule is that, owing to the difficulty in determining not only whether the abscess be in the temporosphenoidal lobe or cerebellum, but also whether sinus thrombosis be present as well (he has already quoted a case in which, from the absence of more than a single rigor, the condition was unsuspected), the skull should be opened at a spot whence access may be readily had to these three localities. If the pin of a trephine be placed on a spot an inch and a quarter behind and a quarter of an inch above the centre of the external auditory meatus, and a circle of bone removed, the lateral sinus and the dura mater just above it are exposed. Thrombosis of this sinus being eliminated the temporosphenoidal lobe may be explored by very slightly extending the hole upward by gouge forceps. Similarly, by cutting away a little bone in a downward and backward direction, thus exposing the whole of the lateral sinus and the dura mater below it, the cerebellum may be reached by passing a trocar and cannula through this portion of the membrane. The fourth rule is that if, after the removal of a subdural or an extradural abscess, the condition does not rapidly improve, or if, after an evacuation of an abscess of the brain proper the signs of cerebral mischief begin to reappear, the wound must be opened up and the brain explored for a further collection of pus. Special care must be taken that the drainage of an abscess cavity is ample, for three of the deaths amongst these cases arose from insufficient drainage of a discovered abscess.

After reporting two fatal cases of brain abscess, Dench¹ calls attention to the custom of otologists, in exploratory operations, of opening the cranial cavity just above the external auditory meatus, irrespective of the symptoms. This meets, as it should, with his condemnation. Each case should be studied carefully before resorting to operation and every clue to localization ferreted out. By this means only will one be able to make the opening of the skull directly over or in the immediate neighborhood of the abscess. The less the amount of healthy brain tissue exposed to infection, the greater will be the chance of recovery.

The case which is outlined below is of interest because of the size of the abscess, and because of the considerable amount of brain substance

¹ American Journal of the Medical Sciences, August, 1905.

mingled with the pus. Kennedy¹ who reports the case considers it possible, and indeed probable, that the largeness of the cavity was caused by compression as well as destruction of brain tissue and that the obliteration of the cavity was due as much to the re-expanding of the surrounding brain tissue as to the production of granulations. The patient had been troubled with an offensive discharge from the right ear for five years. Two weeks prior to the operation he first experienced pain in the region of the ear; the discharge became less, and he had one or two attacks with chills and vomiting. The day before the operation he was only semi-conscious, with a pinched face and slow and shallow breathing. His pulse was full and slow. His right pupil was fully dilated but fixed, not reacting to light. The left pupil was normal. There was a right divergent squint and optic neuritis of the right eye. The lower part of the left side of the face was partially paralyzed and there was some paralysis of the left arm. After opening the mastoid antrum a small erosion was found containing a small quantity of pus. The skull was trephined at this point and when the bone was removed the dura appeared dull and did not pulsate. The dura was opened and about one-eighth of an inch below the level of the cortex, in the temporosphenoidal lobe, a large cavity containing gas and broken-down brain tissue was found. About four ounces of pus were evacuated. The patient made an uneventful recovery.

Congenital and Traumatic Cysts of the Brain and Meninges. Congenital tumors arising from a developmental deficiency of meninges and brain are commonly called cephalocele, although Lyssenkow restricted the use of this term to those tumors due to a partial or local developmental failure, and reserved the term exencephaly for those resulting from a general error in the development of the skull. After reviewing the etiology and structure of these lesions Rawling² considers the question of the operative treatment and for this purpose adopts von Bergmann's classification into these two main groups:

Inoperable.

- (a) When associated with premature synostosis and microcephaly.
- (b) When associated with hydrocephalus.
- (c) When associated with marked deformity.
- (d) When the tumor is situated below the external occipital protuberance.

Operable.

Limited protrusions, with none of the above defects and disadvantages.

¹ Glasgow Medical Journal, January, 1905

² St. Bartholomew's Hospital Reports, vol. xl.

This classification excludes the great majority of cephaloceles from any radical surgical interference, and the cases remaining are but few in number and entirely limited to the nasofrontal variety. The operative results are most discouraging; the mortality is high, and even in those that survive the late results are most unsatisfactory. On the other hand, nearly all cases not treated surgically die at an early age. Various methods have been suggested to close the defect in the skull. Lyssenkow recommends an osteoplastic operation similar to that advocated by Koenig and Müller for the closure of traumatic defects. Koenig and von Bergmann disapprove of this method on the ground that the skull is too thin to enable one to split off the external table. Vasefin and paraffin injections have been suggested for the closure of the nasofrontal variety; the transplantation of animal bone and the use of silver or celluloid have been tried, but with no great success.

Cysts resulting from a severe head injury are very varied in their site, size, and contents. They vary from a small intracranial cyst to one projecting through a gap in the calvarium, which, though covered by scalp and thinned-out brain matter, yet contains a central cavity, filled with cerebrospinal fluid and in direct communication with the ventricular space. Rawling classifies them as follows:

1. *According to their situation.*

(a) *Within the calvarium.*

1. Between the dura and the bone.
2. Between the dura and the arachnoid.
3. Within the arachnoid (?)
4. Between the arachnoid and the pia.
5. In the brain itself.

(b) *Projecting through a gap in the skull.*

1. Communicating with the ventricles.
2. Distinct from the ventricular cavity.

2. *According to their origin.*

1. Arising from changes in a blood clot.
2. Arising from other causes (see later).

3. *According to their contents.*

1. Containing clear fluid serum or cerebrospinal fluid.
2. Containing a grumous material—altered blood clot.
3. Containing brain substance.

The great majority of cysts within the calvarium are either immediately above or below the dura and are due either to the irritation of a depressed fragment of bone leading to the formation of adhesions and the walling off a space with cystic accumulation, or to the shrinkage of the brain which results from local sclerotic changes—cysts *ex vacuo*. The symptoms vary, of course, according to the size and situation. They are more

apt to give rise to symptoms of pressure if they are situated over the motor area, although a large intracranial cyst may exist without giving rise to any evidence of cerebral irritation. Traumatic meningoceles are extremely rare, and in the majority of cases it will be found that, owing to the fact that the dura has been lacerated, the cyst is covered only by scalp (false traumatic meningocele) and not by the dura (true traumatic meningocele). In some rare instances the cyst communicates directly with the lateral ventricles, especially if the injury was in the neighborhood of one of the ventricular horns.

Synopsis of Thirty-seven Cases.

(a) *Sex.*

Males, 16.

Females, 13.

Sex not stated, 8.

(b) *Age at the time of injury.*

Youngest, newborn child, forceps injury.

Oldest, fifty-two years.

One case at birth.

Sixteen cases under one year, eight being less than six months old.

Fourteen cases between one and three years.

One case between three and ten years.

Two cases between ten and fifteen years.

Two cases between fifteen and twenty years.

One case between twenty and thirty years.

One case between thirty and sixty years.

(c) *Region affected.*

Right frontal, 2; left frontal, 4.

Right parietal, 16; left parietal, 3.

Right frontoparietal, 1; left frontoparietal, 0.

Right parieto-occipital, 4; left parieto-occipital, 1.

Right parietotemporal, 2; left parietotemporal, 1.

Right temporal, 1; left temporal, 1.

Right side, 26; left side, 10.

Parietal region involved in 28 to 37 cases.

(d) *Date of appearance of tumor after receipt of injury.*

Appeared at once, 7.

Appeared in first week, 7.

Appeared in second week, 11.

Appeared in third week, 4.

Appeared in second month, 1.

Appeared in fourth month, 1.

Appeared in sixth month, 1.

Appeared in eighteenth month, 1.

Ten cases not recorded.

(c) *Result.*

Recovered, 23; 2 incised; 13 aspirated; nothing done in 8.

Died, 13; 3 incised; 9 aspirated; nothing done in 1.

(f) *The cause of death.*

Meningitis, 5; meningoencephalitis, 4; cerebral abscess, 1; sup-
puration, 1; uncertain, 2.

Reviewing these tables, the following conclusions may be drawn: (1) That quite young children show a special liability to this complication of skull fracture. While the greater elasticity of the infant skull and the greater adherence of the dura to the overlying bone may in part account for this preponderance in children, Rawling believes the greater recuperative power of the infant is of more moment. A blow in the adult which causes laceration of the membranes, as well as severe laceration of the cortex, generally leads to a fatal issue. (2) In the majority of cases the protrusion appeared within two weeks from the time of the accident. (3) The high mortality after aspiration is accounted for partly by the fact that several cases were treated before the days of aseptic surgery.

There are three courses open to one for the treatment of this complaint: (a) the open method, (b) aspiration and puncture, and (c) the expectant plan combined with steady and uniform pressure. In only exceptional instances is the open operation justifiable; usually the dura mater is so torn, the gap in the skull so large, and the surrounding bone so thinned that an osteoplastic operation is out of the question. The high mortality after aspiration should not deter one from resorting to this method, as the modern aseptic technique should lead to more satisfactory results. Aspiration should be followed up by steady and uniform pressure with elastic bandages, care being taken so to regulate the degree of pressure as to guard against symptoms of general cerebral compression. This method of treatment, though not yielding very satisfactory results, is the only feasible one in the majority of cases.

Epilepsy. The surgical treatment of epilepsy may be said to have made little if any progress during the past decade. One might go even farther than that and say that the tendency to-day both with neurologists and surgeons is rather a conservative one. As a result, fewer cases are now referred to the surgeon for operative intervention. This reaction against operative intervention has been due to a number of factors. In the first place there is no doubt but that a number of cases have been operated upon unwisely and that proper discrimination has not been exercised in the selection of cases, and that the general results on the whole have consequently not been good. In the past, surgeons and

neurologists have been in the habit of recommending for operation those cases in which there was a definite history of traumatism or those cases which belonged to the Jacksonian type. If a scar, or depression of bone was found over the motor cortex, corresponding in any way to the centre presiding over the group of muscles in which the convulsions began, the case was thought to be a suitable one for operation. Operation was performed, and if a spicule of bone was found it was removed; if meningeal adhesions were present they were divided; or, if a traumatic cyst was discovered, it was evacuated. Many of the patients were those in whom the epileptic habit had become firmly established; naturally the results in such cases were not good. If adhesions were the exciting cause, they almost invariably reformed; if a traumatic cyst was found and evacuated it usually refilled. If a spicule of bone was the source of irritation the structural changes which it had produced in the cerebral cortex were so fully developed and of so permanent a character that the removal of a spicule of bone or depressed fragment had no permanent effect upon the convulsions.

The great difficulty with which both surgeons and neurologists have to contend in the treatment of epilepsy is the mystery as to its etiology. Many theories have been advanced as to the origin of this disease, but with the exception of traumatic cases no definite lesion has ever been found, and even in the traumatic cases, we know that in some instances an injury to the brain will be followed by epilepsy, while in others a precisely similar lesion will have no effect whatsoever. von Bergmann and Kocher are advocates of the theory that the attacks are due to increased intracranial tension which they hold responsible for that peculiar condition known as the "status epilepticus." Upon this theory Kocher founded his plan of operation, which consists in trephining the skull and in removing a section of the dura. This may be said to be the one operation which has been constructed on a really rational basis. Friedrich¹ presents a very exhaustive report upon a series of 11 cases which have been operated upon between 1899 and 1901.

So far as his experience goes he has found Kocher's theory a satisfactory explanation in all his cases, and he believes that von Bergmann goes too far when he expressed the opinion that the operative treatment will be successful only if performed before the epileptic habit has become established. While this is a somewhat exaggerated statement, there is no question, in Friedrich's mind but that many more epileptic subjects are being benefited if not cured by operative treatment. This is true not only of traumatic epilepsy, but also of idiopathic epilepsy and Friedrich has tried to prove that in the latter cases a favorable influence

¹ Archiv f. klin. Chir. Band lxxvii., Heft 3.

has been exerted upon the cerebral cortex at least in so far as the psychic condition is concerned, by surgical measures. The difficult point to determine, especially in the idiopathic epilepsy, is the point at which the brain is to be attacked. All the cases, eleven in all, have been under observation for a period of four to six years. All were cases of severe idiopathic epilepsy. The duration of the illness varied from four to twenty-five years. They were all men, from seventeen to thirty years of age, and in six cases showed some hereditary tendencies; four of the cases were idiots, and three of them were left out of the consideration because the results were doubtful. The operation which Friedrich practised in these cases consisted in the reflection of a large flap composed of the scalp and periosteum, and in the removal of the underlying bone and dura. In none of the cases operated on save one, did the brain bulge in the course of the operation through the dural opening. The results of the operation as affecting the cerebral cortex were varying. In some cases there was absolutely no change at all, and in others there was marked atrophy. All of the cases operated upon were treated for months afterward with bromides. The most suitable cases for operation are those in which the dura is uniform in its manifestations and those in which there has been a history of trauma, *even though the convulsive seizure does not begin at a point which would correspond to the seat of injury*. Even where there was a distinct evidence of traumatism, Friedrich determined upon the site of operation from the dura rather than with any reference to the site of the injury.

In a report upon the results of non-traumatic surgery of the brain Putnam and Bullard¹ comment upon the results obtained in the operative treatment of epilepsy at the Massachusetts General and Boston City Hospitals. At the former institution out of twenty-one cases treated nine were benefited and twelve unimproved. With reference to this series, Putnam makes the following very pertinent remarks:

"The history of these cases, taken in connection with the experience of others, leaves no room for doubt that the cleaning up of the results of old injuries to the cerebral membranes and skull, results favorably in a fair number of cases. The favorable outcome seems to be due in part to the removal of reflex irritations and to the securing of better conditions of local nutrition of the cortex. The results are, however strangely variable, and there is a mystery hanging over the matter which only a far better knowledge than we now possess, of the physiology of the brain and the pathogenesis of epilepsy, can dispel. The most important point as regards the treatment of epilepsy by operation is as to the value of excision of motor areas of the cortex, in cases with localized

¹ Boston Medical and Surgical Journal, July 20, 1905.

dura. This is still in doubt. There is much to say of a practical character in its favor, but our knowledge of the physiology of the brain and the genesis and nature of the epileptic seizure is still too immature to be utilized satisfactorily as the basis of so radical a procedure.

"It would be idle to claim that this report represents the best that neurology and surgery can accomplish in the operative therapeutics of these important diseases. It is a bare record of interesting hospital experiences, acquired through a conscientious following of established methods. The next report, rendered perhaps at the termination of another decade, will doubtless tell of more instances of success.

"But when the time comes that in each one of our great hospitals one surgeon is given the opportunity of cultivating this branch of neurological surgery as a specialty, then first we shall be able to do our best work. Surgeons with neurological training are positively needed. The difficulties in the way of deciding whether to operate, where to operate and how to operate are so great that the man who is to succeed must have long bathed to the neck in physiological, pathological and neurological research, and must have made his hands the ready servants of his will, in that particular line. The most useful hospitals of the future, from the standpoint of the community, are likely to be strongly characterized for their encouragement of specialism and team-work."

At the Boston City Hospital, Bullard reports a series of eighteen cases in which the skull was trephined for epilepsy, twelve of these were of traumatic origin, eight were relieved, three unrelieved and in one the result was doubtful. Of the non-traumatic cases there were six. Apoplexy, with multiple cysts, one relieved; idiopathic, two; one improved; in the other in spite of possible temporary relief the disease seems to have progressed. Two of the cases died (cases 4 and 12) and in both multiple cysts of the brain were found at the autopsy. In two other cases (cases 10 and 17) cysts were found on operation. Three of these cases were supposed to be due to trauma, one non-traumatic. It seems probable that when cysts are present, the result of operation is likely to be more favorable than in those cases where they do not exist. Our statistics on this point are too few to be of value. Of special interest is the long duration of the disease in some of the cases which were relieved. It has been commonly supposed that after two or three years an epileptic habit was likely to form, which might and probably would continue, even after the removal of the existing cause. Cases 11 and 21 are instances of relief after long duration of the disease. In the first, the injury had occurred eighteen years previous, and in the second the cyst had apparently been in existence twenty-five years.

If we sum up the results obtained in these hospitals we find that in thirty-nine cases, eighteen are reported as relieved or benefited, two as

improved, sixteen received no benefit, in one the result was doubtful and two died. Expressed in percentage figures 51 per cent. were relieved or benefited and 49 per cent. were not relieved. This seems to me a most encouraging report, and the percentage of cases which are benefited by the operation is very much higher than the average. In the March 1905 issue of *PROGRESSIVE MEDICINE* attention has been called to remarks which were made in an article by Dr. Munro. At that time he emphasized the importance in operations upon the brain, and especially in cases of epilepsy of making careful and minute observations upon the appearance of the tissue and findings in the field of operation.

Craniectomy in Microcephaly. If one is in doubt as to the efficiency or rather inefficiency of the operative treatment of microcephalus, a visit to one of the State institutions for feeble minded children will settle the matter beyond a shadow of doubt. There one will find a number of wretched little microcephalic creatures, who at one time or another have been victims of an over-enthusiastic surgeon. 'Teagarden' reported a case of craniotomy upon a microcephalic child in which the physical condition of the child improved although the mental development had not been influenced. The more experienced of both the surgical and neurological professions have, I believe, at last placed the stamp of disapproval on this procedure.

Cranial Nerves. INJURIES TO THE TRIFACIAL NERVE FOLLOWING FRACTURES OF THE SKULL. As compared with the other cranial nerves, the trigeminus is very seldom affected in injuries to the base of the skull, and in most cases we find that the injury is limited to but one of its divisions usually the ophthalmic branch, and in but five of fourteen observations which were made was it found that sensation was lost throughout the entire region supplied by the nerve. There have been some cases in which certain trophic disturbances have been reported, particularly keratitis, and others in which the facial and abducens nerves have been injured simultaneously. That the trigeminus should escape injury so frequently in basal fractures, must be due to the fact that the usual line of fracture lies somewhat more distant from the trifacial than from the other nerves. Ordinarily the injury to the nerve is due to a thrombosis of the cavernous or superior petrosal sinuses or else pressure from a blood clot. Cabannes et Bonnet² allude to a case in which fourteen days after fracture of the base of the skull there was noticed for the first time a keratitis and iritis of the eye on the affected side, together with sharp pain and complete amaurosis. In course of time the symptoms

¹ Pennsylvania Medical Journal, November, 1905.

² Soc. de med. et de chir. de Bordeaux, December 16 1904.

all subsided, with the exception of a light impairment of the visual sense.

TRIGEMINAL NEURALGIA. The only publication of any note (chiefly because of its comprehensive scope and not because of any claim to originality) upon the subject during the past year, appears as a monograph by J. Hutchinson, Jr.¹ This monograph treats the subject in a systematic way dealing with the causes, variety, and treatment, including the various operative procedures. It contains 151 pages and 22 illustrations. In his classification he recognizes very properly two types: the minor, in which there is usually some form of peripheral irritation, the removal of which may be sufficient to afford relief, and the major, or epileptiform neuralgia, which is more often not traceable to any peripheral source of irritation and is relieved only by a central operation. The chief features of the latter he sums up as follows: 1. It is almost invariably unilateral. 2. It commences in the distribution of either the second or third division of the fifth nerve, and tends to involve both to the same extent. 3. The first (ophthalmic) division, so frequently concerned in cases of minor neuralgia, is involved comparatively little in epileptiform neuralgia. Radiations of pain in the ophthalmic distribution and that of the cervical nerves often, however occur. 4. The attacks of pain are paroxysmal or spasmodic and tend to steadily increase in severity whilst the intervals of freedom from pain shorten. 5. During each attack there is usually a spasm of the facial muscles on the affected side. 6. No cause can, as a rule, be assigned for the onset of the disease, but talking, eating, or exposure of the skin to slight cold or light pressure, invariably bring on the attacks when the disease is well established. 7. The subjects of the disease, at its onset, are usually adults between the ages of thirty and fifty years. Males are more often the subjects of it than females. 8. Its progress is one of steadily increasing severity lasting an indefinite number of years. Spontaneous cure is almost unknown. 9. Medical treatment, except increasing doses of morphine, has little or no effect. All kinds of operations on the peripheral branches of the fifth nerve may give temporary relief. 10. Partial or complete removal of the Gasserian ganglion alone affords a permanent cure.

With reference to the pathology Hutchinson is very positive in the belief that there are no changes in the structure of the ganglion which in any way accounts for the symptoms. After reviewing the views of Spiller and others upon the pathology of the Gasserian ganglion, he says, it may therefore be taken as proved that in many case of epileptiform neuralgia of long duration the Gasserian ganglion and its main branches show no pathological change, and that the disease has, moreover, no

¹ The Surgical Treatment of Trifacial Neuralgia, Wm. Wood & Co., New York.

relation to impaired blood supply due to arterial narrowing, etc. The few observers who have described abnormal appearances in microscopic sections from such cases vary much in their accounts. With reference to the treatment, Hutchinson is in favor of the peripheral operation only when one branch is involved, realizing the great tendency toward recurrence and the necessity for subsequent operations. When once the neuralgia has spread from one division to another, it is useless to waste time over extracranial operations. The remainder of the monograph is devoted to the description of the various operative procedures. He prefers the original Hartley-Krause incision and flap, and sees no advantage in an osteoplastic flap, nor in the approach to the ganglion through a low incision, which necessitates the resection of the zygoma, a procedure accredited to Poirier. He believes it to be certainly unnecessary to remove the ophthalmic division if it is not involved at the time the operation is performed. In most cases he says he approves of limiting the interference to the lower part of the ganglion, with its second and third divisions; he believes the interposition of rubber tissue (Abbe's method) provides against an imaginary risk, and thinks it unfortunate the method of dividing the sensory root should have been exploited and fears that, if it is taken up by many surgeons, discredit will be brought on the whole subject of operations on the Gasserian ganglion. Hutchinson deprecates the fact that this dangerous method during the last year (1903-1904) has been revived by other surgeons. He finds it more convenient to ligate the meningeal artery, but has found that no apparent effect was produced by ligating the external carotid artery, so free is the collateral circulation. Such a heavy death rate (20) as is seen in the collection of cases made by Keen, Tiffany, and others is "fortunately quite needless" as Sir Victor Horsley has performed 120 operations with but six deaths. He takes exception generally to the views entertained by American surgeons and seems thoroughly convinced that no exception can be taken to his personal opinions upon all subjects pertaining to trigeminal neuralgia.

SINUS DISEASE AND TRIFACIAL NEURALGIA. That there are a certain number of cases of trifacial neuralgia caused by diseases of the sinus is well known; these cases are however at first at least, of the minor type, although eventually true major tic may develop. Snow¹ makes rather extravagant claims for such a lesion as the cause of neuralgia, when he says that it appears from statistics that 80 per cent. would be a modest estimate of the cases arising from intranasal and sinus pressure. He goes on to say that in twenty chronic cases which have been under his care he has seen none that were due to dental

¹ New York Medical Journal and Philadelphia Medical Journal, January 14, 1905.

caries, to pressure on the nerve trunks or any that required excision of the nerve for relief. Each of them had well-marked intranasal pressure or a collection within some of the accessory sinuses.

EXCISION OF THE GASSERIAN GANGLION. I have found a few cases reported in the past year in which the ganglion was successfully removed. The operation is no doubt more frequently performed, but few of the cases find their way into the literature. Harrison¹ removed the ganglion in two cases, and reports that there has been no recurrence, although eight years have passed since the operation. In one case the patient was forty-five years of age and had suffered for five years, and in the second case the patient was forty years old and had been afflicted for three years. Moore's² patient was only thirty-seven years of age and had had for the past seven years numerous attacks of neuralgia, beginning in the distribution of the second division, later extending to the third division. As the hemorrhage was so severe, when the first attempt was made, the subsequent steps of the operation were postponed for forty-eight hours, the ganglion was finally removed piecemeal and the patient made an uneventful recovery. Horsley³ performed two operations for the relief of trifacial neuralgia: in one the ganglion was removed intact; in the second case a modified Abbe's operation was performed, the second and third divisions being divided, the adjacent portion of the ganglion removed, and a piece of rubber tissue about one and one-quarter inches wide by two inches long was laid over the floor of the middle fossa covering the foramen rotundum and foramen ovale. Both of his patients made uneventful recoveries.

REGENERATION FOLLOWING EXTRACTION OF THE BRANCHES OF THE TRIGEMINUS. In 1889 Tiersch first recommended his method of extracting nerves as a substitute for neurotomy and resection of the nerves, and expressed the hope that he had found a method which would guarantee against recurrence. The method consists in grasping the nerve with a pair of specially constructed forceps not unlike hæmostatic forceps, and slowly twisting the forceps on their long axis so that the nerve is gradually extracted both centrally and peripherally. By this means not only is the main trunk removed, but also the finest terminal filaments and the specimen is as perfect as though it had been prepared by careful dissection. In seventeen cases which Friedrich was able to follow up after this operation, six remained free from recurrence, two were improved, in six there was recurrence, and in three the result was doubtful. Angerer found in sixteen cases that had been observed for a period of more than four years that there were six recurrences, and so other

¹ Liverpool Medico-Chirurgical Journal, January, 1905.

² Carolina Medical Journal, April, 1905.

³ Ibid.

statistics could be quoted to prove that the operation, perfect as it seems in its technique, does not always give the desired result.

Perthes¹ attempted to explain the recurrences which followed after apparently successful operations, and reports two cases which prove, he believes, that recurrence is due to regeneration of the nerve. After an ordinary neurotomy or limited resection of a nerve, one can readily understand how regeneration may occur, and account for recurrence of the symptoms, but regeneration of a nerve removed by the Tiersch method would seem almost impossible. Both Tiersch and Krause have said that they could not consider the regeneration of the nerve as an explanation and that some other cause must be looked for. Krause for example suggests that the recurrence of pain may be due to the establishment of a collateral circulation with adjacent nerves or even with the nerves on the opposite side. Perthes describes in great detail the history of a case, in which the persistent recurrence of sensory disturbances after repeated operations upon the nerve, some intra and some extracranial, was extraordinary. From the record of this case he concludes that the recurrence of pain must have been due to regeneration.

In this case the neuralgia involved the third and later the second divisions of the trigeminus. In 1892 the inferior dental was extracted, in 1893 the third division was resected at the foramen ovale by the Krönlein method. In 1897 the second and third divisions together with the adjacent portion of the ganglion were removed. Despite these previous operations the neuralgia recurred four years later when the infraorbital and mental nerves were extracted. Two years later Perthes found in the same patient the second and third divisions at their exit from the base of the skull well preserved. The portion of the third division extracted measured 11 cm. and that of the infraorbital 3 cm. In both sections the presence of nerve fibres was proven. Thus in spite of the previous peripheral operations, and in spite of the intracranial division of the second and third branches and the removal of a portion of the ganglion six years before these nerve trunks had regenerated. Five months after the last operation the patient died as a result of some circulatory disturbance which was attributed to emphysema and tricuspid insufficiency. The specimen which was removed at autopsy presented the shape and size of the Gasserian ganglion, similar to that of the unaffected side. It contained further certain strands which in their form and both in their intracranial and extracranial course resembled the branches of the trigeminus. The infraorbital, lingual and inferior dental nerves were removed by dissection and a careful microscopic examination showed that not one of the three nerves presented a

¹ Deutsche Zeitschrift f. Chirurgie, Band lxxvii., Heft 4-6.

perfectly normal appearance. The greater portion of them consisted of connective tissue, although in all three there were a certain number of nerve fibres. The microscopical examination of the Gasserian ganglion showed also certain deviations from the normal although it showed the ganglion preserved to a surprising extent. The microscopical examination of the second and third divisions showed conclusively that they had undergone degeneration, bundles of nerve fibres could be demonstrated beyond question in the region of the foramina rotundum and ovale. From a neurological point of view it would have been interesting to determine whether these fibres had been regenerated from the ganglion cells or whether the regeneration was autogenetic. This could not however be determined. It suffices to know that there were regenerated fibres connected with the ganglion and running along the course of the old nerves. The clinical observations agreed in every way with the anatomical findings. With the onset of recurrence sensation began to return. This case is unquestionably one of tremendous interest to both surgeons and neurologists, in that there is evidence that in one branch at least radical resection was followed in five different occasions by regeneration of the extracted nerve.

RESECTION OF THE SUPERIOR MAXILLARY DIVISION OF THE TRIFACIAL. In speaking of the technique for the resection of the superior maxillary division, Ptherat¹ calls attention to the differences that will be found in operating upon men and women. In the case of the latter, as soon as the external pterygoid muscle has been displaced backward, one is able to see without any difficulty immediately to the one side of the upper insertion of the muscle the sought for nerve. The nerve is caught in a hook, drawn forward and divided close to the base of the skull. With men, however, the muscles being better developed and the bones of larger proportion, one is unable to see the nerve at first since it is buried in dense fibromuscular tissue. The nerve lies behind the tuberculum pterygoideum of the sphenoid bone, and before it can be brought into view it is necessary to chisel off this bony process. The author prefers an L-shaped incision to any other, inasmuch as the resulting scar is less conspicuous. He makes a long horizontal incision following the broad border of the zygomatic arch, and at the outer end of the first incision a short vertical incision.

RESECTION OF THE INFRAMAXILLARY DIVISION OF THE TRIGEMINUS. Already many modifications of the Krönlein method of dividing the second and third branches of the trigeminus have been suggested. Quite recently Lexer² proposed a method, which he elaborated upon the cadaver and practiced several times upon the human subject,

¹ Bull. et. mem. de la. Soc. de Chir. de Paris, No. 8, 1905.

² Zentralblatt f. Chirurgie, No. 30, 1905. p 23.

differing essentially from Krönlein's method in the incision and in the subcutaneous division of the zygoma. The principal advantages claimed for the method are that it economizes time, that it avoids injury to the frontal branches of the facial nerve, that it avoids the necessity of ligating either the temporal or meningeal arteries, that it leaves undisturbed the lower jaw, and therefore does not require any suture of the divided bone. He makes a horizontal incision along the upper border of the zygoma through the skin and temporal fascia, beginning at the anterior portion of the malar bone, and extending only up to the temporal artery. The lower angle of the wound is drawn downward, thus making it possible to divide the zygoma at either extremity. As in operations upon the ganglion the chisel is applied at the foot of the frontal process of the malar bone, taking care to avoid the soft parts. The posterior border of the temporal muscle is freed from the bone and with a sharp hook drawn forward, thus exposing the infratemporal ridge over which the periosteum is divided. A broad retractor is then introduced into the periosteal wound; the periosteum and the attachment of the pterygoid muscle, being free from the bone, they are drawn, together with the zygoma, somewhat downward and forward, thus exposing the inferior temporal fossa, at the bottom of which lies the foramen ovale with its third branch. The nerve is drawn forward with a hook, grasped with the forceps and torn out. Even the second division can be reached and resected without much difficulty. The only source of hemorrhage which may be troublesome will come from the vein which passes out through the foramen ovale to join the pterygoid plexus. The vein, however, may escape injury.

FACIAL NERVE. FACIAL PALSY. The subject of the operative treatment of facial palsy has been considered in previous numbers of *PROGRESSIVE MEDICINE*, and there is little that has appeared during the past year that throws any additional light upon the subject. No one I think questions the propriety of this mode of treatment in selected cases. The operation is founded upon a physiological law proved by experimentation, and the clinical experience of a number of observers has established all that was claimed for it. One must not expect from this mode of treatment a *restitutio ad integrum*. A perfect cure has not been obtained in any of the twenty-five or more cases that have been reported. In the majority of cases we will find that the facial asymmetry has disappeared, that the tonicities of the paralyzed muscles has been restored, and in some instances there has been restitution of involuntary and less frequently voluntary muscular control. As it has been pointed out, the procedure may be said to be cosmetic in its effect in that in a state of repose the symmetry is restored. The one feature, in the technique of the operation, which has given rise to a difference of opinion

among surgeons is the choice between the eleventh and twelfth nerves. This whole question hinges upon the importance attached to associated movements. So far as I have been able to ascertain there has been but one case reported in which the anastomosis of the facial to the spinal accessory nerve was not followed by associated movements of the muscles supplied by the spinal accessory nerve. This was a case reported by Elsberg at a meeting of the New York Neurological Society¹ in which the facial nerve was anastomosed with the spinal accessory by splitting both nerves, and joining that branch of the eleventh which supplies the trapezius muscle to the isolated portion of the facial nerve. Thus neither the eleventh nor the twelfth nerves were entirely divided. This case is interesting, not only because of the absence of associated shoulder movements, but also because of the long duration of the paralysis, twenty-nine and one-half years having elapsed before the operation was performed. If on the other hand the hypoglossal nerve is isolated and an end-to-end anastomosis effected there would follow necessarily a paralysis of one-half of the tongue. While this is more or less unsightly, it gives rise to no very serious functional disturbances, and eliminates the possibility of the development of any associated movements. Taylor² has modified the technique in such a way as to avoid the necessity of dividing the hypoglossal nerve. He has found it possible to effect an end-to-side anastomosis between the facial and hypoglossal nerves. This is a very valuable contribution to the technique of this operation, in that it removes the one objection, namely the semilingual atrophy, which has been advanced against the use of the hypoglossal nerve. With the final reports of his cases I am not familiar, but I am under the impression that his results were more than promising.

At a symposium upon facial palsy, held under the auspices of the New York Neurological Society, I presented a further report of a patient I had operated upon eighteen months ago. I called attention to the fact that the voluntary movements at the angle of the mouth did not appear until seventeen months had elapsed. The patient was able to close the eye almost completely and all the muscles responded to the faradic current. Another interesting feature of the case, to which I called attention, was the restoration of the involuntary before the voluntary movements. The muscles supplied by the branches of the cervico-facial division regained their power before those supplied by the temporo-facial division.

Gluck³ who has previously contributed articles upon this subject,

¹ New York Medical Journal and Philadelphia Medical Journal, August 5, 1905, p. 308.

² Ibid.

³ Zeitsch. f. Diätet. u. Physikal. Therapie, April 1, 1905, p. 33.

writes of the importance of systematic exercises after this operation. He referred to a case in which he had anastomosed the facial and spinal accessory nerves and in which he prescribed with success a series of exercises. In the first stage of the treatment the patient practised the use of the previously paralyzed muscles while he simultaneously raised the arm. In the second stage he was instructed to carry out exercises for the purpose of educating the spinal accessory muscles on the one hand, and the sternomastoid and trapezius on the other. To accomplish this the facial muscles are set in action, while the shoulder is more or less fixed by a weight carried in the hand. The third stage consists in practising co-ordination of the muscles of the two halves of the face. Three years after the operation, co-ordination of the two sides of the face was finally acquired.

It is scarcely necessary to allude to the details of the operative technique. The same principles which should govern one in nerve suturing generally, apply here with equal force. It is of the utmost importance to remember that the nerves must be subjected to a minimum degree of traumatism, otherwise the process of regeneration will be materially interfered with. Anything which excites to the formation of excessive cicatricial tissue whether it be rough manipulation of the tissues about the nerve or infection, is a menace to success, and must be scrupulously avoided. A minimum number of sutures should be used and the point of anastomosis should be enveloped with Cargile membrane. Taylor uses a set of instruments which he has had specially constructed for this particular operation.

It is rather surprising that this operation has not been resorted to more frequently than it would appear from the list of published cases. The disfigurement arising from facial palsy is so unsightly and so many cases fail to respond to palliative measures, that one would rather have expected to find that the operation had come to be a very common one, and yet so far as I know, there have been but twenty-five or thirty cases reported.

AUDITORY NERVE. TINNITUS AURIUM. Krause was the first to suggest the possibility of relieving persistent tinnitus aurium by an intracranial division of the root of the eighth nerve. Since that time but three operations of this character have been performed, one by Wallace and Marriage, one by Parry and one by Bryant.¹ In a very admirable paper upon this subject, Bryant calls attention to the importance of locating the source of the tinnitus previous to the operation. It is of course only in certain selected cases that the operation will be of any permanent benefit. A tinnitus of central origin would not of course be

¹ Journal of the American Medical Association, December 9, 1905.

relieved. The source of the tinnitus must be located in or about the labyrinth. The most promising cases for nerve section he believes are those with definite cochlear lesions, low pitch tinnitus, a tinnitus of varying character and pitch. Tinnitus of high pitch, musical tinnitus or even a complete deafness in both air and bone conduction should be regarded as contraindications to the operation. In my review of the surgery of tumors of the cerebello-pontile angle, I called attention to the comparative ease with which the seventh and eighth nerves may be exposed in exploring this region. It was by this route that Krause performed his operation. It was reported that the tinnitus was lessened, but the patient died on the fifth day. Wallace approached the auditory nerve directly through an opening made for a common mastoid operation. The operation was performed at two sittings, and was attended with a great many difficulties. In this instance also the patient died and the tinnitus was not entirely relieved. Parry in the third recorded case, followed a route through the middle fossa and the petrous bone. The patient recovered from the operation and it was reported a year later that the tinnitus was considerably better. The slow improvement in the patient's condition suggests the possibility of the unimportant part which the section of the nerve played in its effect upon the tinnitus.

There is a certain amount of risk in the exposure of the nerve through the posterior fossa; there is some danger attending the forcible displacement of the cerebellum. The difficult feature of the operation, however, is the separation of the facial from the auditory nerves. These two nerves lie in absolute contact with one another at this point and in such a relation that the facial nerve is concealed and surrounded on almost all sides by the auditory nerve, the separation of these two nerves is therefore a delicate procedure and there is always a possibility of a few of the fibres of the auditory nerve being left undivided or of a few of the fibres of the facial nerve being divided. Bryant's case survived the operation, but there was only slight improvement. After the performance of sixty-five auditory neurectomies on the cadaver, he was able to practice the operation with no difficulty and without any injury to the facial nerve. The technique of the operation which he elaborated is as follows: Inverted "U" skin and periosteal flaps are cut with their anterior limb behind the posterior edge of the mastoid process and extending about an inch and a half upward from the centre of the lateral sinus. The posterior limb extends downward to the lateral sinus, about an inch and a half behind the anterior limb. An osteoplastic flap may be made, but his experience shows that it is usually inexpedient, because of the great thickness of the bone and because of the impossibility of locating absolutely from the outside the position of the lateral sinus. The uncovered bone is perforated by a front-bent

gouge, and the opening enlarged with a heavy rongeur and carried well forward as far as the superior angle of the petrous pyramid and downward to the lateral sinus. The dura mater is cut with a "U" flap opening forward; the cerebrum is then carefully lifted with a spatula and the anterior surface of the petrous bone is explored for the eminence of the superior semicircular canal, which is the land-mark for the route to the auditory nerve. If the cerebral veins are not found lying across the field of operation, a cerebral speculum is inserted to hold the cerebrum up off the anterior portion of the tentorium. If the cerebral veins are in the way, they are first pinched off. With a probe the edge of the petrous bone is located, and with a bistoury a longitudinal cut is made in the tentorium parallel to the edge of the petrous bone, but well behind it, to avoid the superior petrosal sinus. Veins generally can be distinctly seen running parallel with the edge of the petrous bone and the incision is made posterior to them. The cut is about half an inch long and lies behind the eminence of the superior semicircular canal. With a cerebellar spatula, the posterior flap of the cerebellar incision is drawn backward. To see if the cut is sufficiently long, the spatula is inserted from one-half to three-fourths of an inch, and the cerebellum slowly pushed backward to disclose the brilliant white auditory nerve lying at the bottom of the wound directly in line with the eminences of the superior semicircular canal. A cerebellar speculum is then inserted. The nerve is easily recognized on account of its position and its glistening snow-white appearance. It lies between four cm. and five cm. from the anterior edge of the wound and nearer the opening of the wound than the facial nerve, which lies farther inward and anterior to the auditory nerve. The auditory nerve is grasped by small lock forceps. Care must be taken to avoid pinching the facial nerve. Then the auditory nerve is pulled backward and outward from the internal auditory meatus, and if the proximal part of the nerve is not torn by this time the nerve is pulled outward and forward; the structure of the nerve is so soft and friable that this was found the easiest means of removing it. Next the facial nerve must be inspected, and if any shreds of the auditory nerve are seen lying on it, these are to be removed in the same way as the trunk. In this operation very little displacement of the cerebrum is required and scarcely any of the cerebellum.

SUTURE OF THE HYPOGLOSSAL NERVE. While a number of cases have been reported in which the hypoglossal nerve was accidentally severed either by stab wounds or gunshot wounds, as far as I know there has been but one case where nerve suture has been practised after injury. Wölfler¹ operated upon a case a month after the nerve had been

¹ Bruns: Beiträge zur klinischen Chirurgie, xlv. page 294.

severed. He had some difficulty in finding the two ends of the nerves, inasmuch as they had retracted and were embedded in scar tissue. They were finally brought together however, and retained with three silk sutures. The results were in every way satisfactory; both the faradic and galvanic excitability was restored and the atrophy of the tongue was disappearing.

THE FACE.

Congenital Hypertrophy of One Side of the Face. Werner¹ found records of but nine cases of congenital hypertrophy of one side of the face, including the case under his own observation. The patient, a man aged twenty-four years, had had a considerable enlargement of one side of the face since birth; during the last two years a spot under the left eye had rapidly increased in size. Surgical aid was sought for the discomfort caused by an exostosis of the upper jaw. The offending portion was chiselled off, only to recur at a later period. The hypertrophy involved the bone more than the soft parts. The parietal region, frontal bone, zygoma, ear, mastoid process, cheek, nose, lips, both maxillæ, chin especially, teeth, tongue, uvula, and tonsil were involved in the hypertrophy. The second operation consisted in the removal of a hyperostosis from the upper jaw and as much subcutaneous tissue as possible; much thickening remained, however, because of the concomitant hypertrophy of the muscles. Werner does not believe in the neurotic etiology of this affection, because the enlarged area does not always correspond to the distribution of one nerve, or even group of nerves. Histological examination showed connective-tissue proliferation about the nerves, which must be considered as a result rather than a cause of the hypertrophy. The frequent combination of partial macrosomia with pigmentation fails in experimentally or accidentally produced hypertrophies arising on a neurotic basis. For these reasons Werner thinks the congenital hypertrophies are due to a change in the embryological *anlage* of the parts enlarged. As to the differential diagnosis, only acquired partial macrosomia, acromegaly, and diffuse hyperostosis need be considered. The first is excluded by the history, and the last two through the objective findings. All the other symptoms characteristic of acromegaly are absent, and the involvement of the soft parts excludes hyperostosis.

Osteomata of the Bones of the Face. In reviewing the literature of osteomata involving the frontal sinus several years ago Tauber collected twenty cases, in which the tumor had been removed by operation. In

¹ Arch. f. klin. Chirurgie, Bd. lxxv., Heft. 2

making sections of skulls for the purpose of study, Hastings¹ found an osteoma springing from the floor of the left frontal sinus measuring about three-quarters of a centimetre in diameter. It was directed upward and inward and almost completely filled one-half of the sinus. Its posterior surface was flattened and in contact with the sinus wall. So far as the author is aware no similar specimen has been reported in American literature.

Several years ago Bornhaupt wrote a critical summary of the literature appearing upon osteomata of the orbit. A number of isolated cases have since been reported and quite recently Vischer² reports two cases which came under his observation. The findings in these cases corresponded in every way with those described by Bornhaupt. It is generally believed that these tumors are not in the strict sense of the word osteomata, or tumors which are composed entirely of bone, but are exostoses which owe their origin to a proliferative action of the periosteum. They are not solid tumors, but contain a cavity and are enveloped in a very loosely attached capsule. In the specimens which Vischer examined no trace of cartilagenous tissue could be found, so that it is not proper to regard them as ossified enchondromata. There is a disposition on the part of some to regard tumors of this class as of fetal origin. Bornhaupt found that in 81 per cent. of the cases the patients were less than thirty years of age, and 54 per cent. of cases occurred about the age of puberty. It is of course difficult to determine when the tumors first began to grow since their growth is necessarily slow, and they may be present for a long time without giving rise to any symptoms. It is doubtful whether trauma plays any part at all, as an etiological factor. In a certain percentage of the fifty odd cases which were collected by Bornhaupt in six there was a history of trauma, but even in these several years elapsed between the time of the injury and the appearance of the tumor. It is perfectly proper and justifiable to recommend operations in these cases if for no other reason than to preserve the eyesight. If undisturbed they will eventually compress the optic nerve. The operation is not difficult and there have been no instances of recurrence after the tumor has been completely removed.

Blindness Complicating Paraffin Prosthesis of the Nose. Mintz³ reports an unfortunate complication following an operation for the correction of a saddle deformity of the nose. Shortly after the paraffin was injected blindness ensued. The amaurosis was traced to a thrombosis, extending from the *vanae nasales externae*, the inferior ophthalmic, and thence to

¹ *Annals of Surgery*, April, 1905.

² *Deutsche Zeitschrift f. Chirurgie*, Band lxxvii., Heft 1-3.

³ *Zentralblatt f. Chirurgie*, 1905, No. 2.

the vena centralia retinae. Three other cases of a similar nature have been reported.

Exophthalmus and Chorea Cured by Removal of Adenoids. Holz¹ reports 2 cases of exophthalmus bilateralis in which removal of adenoid vegetations brought about complete cessation of the symptoms. In the first case the protrusion disappeared ten days after operation; a recurrence, two years later, followed, with a return of the vegetation; a thorough excision of the pharyngeal tonsil was followed by a permanent result. In the second case a bilateral tonsillotomy had no influence on the exophthalmos, but it gradually disappeared when the adenoid tissue in the pharynx was removed. Equally good was the result observed in a case of chorea minor, in which the same operation was performed. From the above cases the following conclusions were drawn: Exophthalmus, providing it is not a protrusion due to mechanical cause, justifies the diagnosis of Basedow's disease, even if it is the only symptom present. Morbus Basedowii and its different variations is an affection of the central nervous system caused by abnormal internal secretion. Adenoids may play some part in the etiology of Basedow's disease, chorea, and epilepsy, and their removal is followed by recovery in certain instances.

Cleft Palate. Brophy's operation should be performed on children between the ages of ten days and three months, since after this time the bones are too fully ossified to be safely displaced. In order to lessen the amount of bleeding Staker² defers paring the edges of the palate until the sutures have been inserted, and the bones moved toward the median line. The bones are drawn together with sutures of silver wire, passed transversely through the alveolar processes above the level of the palate processes of the maxilla and palate bones. At first it may be impossible to approximate the bones, and under these circumstances he does not pare the edges, but defers this stage of the operation until he can effect an approximation. The operation has proved successful in children which were both feeble and poorly nourished.

The Lips. **LOSS OF THE ENTIRE LOWER LIP.** A plastic operation for the loss of the lower lip is reported by Watts.³ The patient had the lower lip bitten off by a pony, the periosteum in places being detached. Because of the extent of the wound tissue was taken from the arm, rather than from the face or neck. Accordingly a flap, 12 cm. wide by 18 cm. long, was dissected from the right upper arm, the raw surface being covered with grafts from the thigh. The skin on the under surface was intended to form a substitute for mucous membrane and to prevent

¹ Berliner klin. Wochenschrift, 1905, No. 4.

² British Medical Journal, June 24, 1905.

³ Annals of Surgery, January, 1905.

contracture. The free extremity of the flap was sutured to the left side of the lip wound, and the arm placed in a plaster cast for a period of three weeks. The flap was then severed in several stages to enable the circulation to become more fully established. The article contains many illustrations showing the various stages of the operation and the excellent cosmetic effect obtained.

EPITHELIOMA OF THE LIP. As possessing certain advantages over the ordinary methods, Grant¹ recommends the following operation for epithelioma of the lip or the correction of a deformity of the mouth. Straight incisions are made on either side and transverse incisions connecting the two vertical incisions at their lowermost points. This leaves a quadrangular defect; the flaps are completed by oblique incisions extending downward and backward from each lower angle of the wound. The triangular cheek flaps are separated from the inferior maxilla and united in the midline. Incisions at either angle of the mouth are made and covered with the mucous membrane lying beneath; as no denuded surface remains, skin grafting is not necessary. The skin, if not involved by the carcinoma, is not disturbed, and the removal of the submaxillary glands and the exploration of the anterior triangle can be made through the oblique lateral incisions.

X-RAY TREATMENT OF EPITHELIOMA OF THE LIP. Pusey² has treated 20 cases of epithelioma, all of the superficial type, although many involved a large surface of the lip. In 19 of the 20 cases palpable enlargement of the glands could not be demonstrated, and in as many cases healthy scars were obtained by the treatment. Ten of them have been well over one year. While not so radical a measure as excision, with removal of the submaxillary glands, in cases where the latter method is not necessary or impracticable, Pusey believes *x*-ray treatment entitled to consideration. In cases of epithelioma covering such extensive areas that operation is impossible the *x*-rays offer a suitable method of treatment. Pusey reports cures in 3 cases in which such ulceration was present. As to permanency, 7 cases were cured symptomatically three years ago; 6 are well to-day; 1 died from an acute illness eighteen months later, having a recurrence half the size of a wheat grain. Occasionally there have been small recurrences around the border of the lesions, but, as a rule, they disappear on subsequent treatment. From three to five exposures have been sufficient in many cases, the production of a healthy scar requiring about three weeks' time. If the patient is insensitive to the *x*-rays, a much longer period is necessary.

¹ Surgical section, American Medical Association, July 11th to 13th.

² Journal of the American Medical Association, May 13, 1905.

MAKROCHELIA. This condition may be due to neoplasms, inflammations, and congenital dilatation of the lymphatic vessels. Frequently the tongue is associated with the enlargement of the lip, and even the lower jaw may become deformed. In Lindemberger's case¹ the enlargement was confined to the upper lip, and followed an injury received fifteen years before. During the past ten years there had been no appreciable enlargement. A wedge-shaped incision was made, several small glands removed, and the mucous membrane sutured. Recovery ensued with satisfactory cosmetic results.

HARELIP. Hemorrhage is often a troublesome, though not serious, complication in operations for harelip. To control it the lip is usually compressed between the thumb and forefinger of an assistant; but the method is often inconvenient, especially in very young children when the field of operation may be obscured by the assistant's hand. The use of a temporary suture, placed near the angle of the mouth and passing through the cheek, has been recommended by Kuster.² By this means bleeding is controlled and the long ends of the suture may be used to move the lip about during the operation.

Bayer³ has used for many years a small instrument for the same purpose, constructed as follows: Two parallel blades are connected at one end by two short bars and a screw, the free ends are smoothly rounded and the inner surface grooved to prevent slipping when the screw is tightened. Slipping is further guarded against by a pin which is attached to the inner bar, so that when the instrument is screwed together the mucous membrane is pierced. The compressor does not interfere with the operation, and may be used as a handle to turn the lip in or out in applying the sutures. To prevent undue pressure the branches can be padded with gauze; the small pressure marks on the skin surface disappear a short time after operation.

Pigmented and Vascular Nævi. While the *x*-ray treatment of these conditions may not be ideal, yet in the absence of other more satisfactory methods many observers believe it should be given a trial. Pusey's⁴ experience has been limited to the treatment of a few cases, but the results have been encouraging. One case of an extensive hairy pigmented nævus of the forehead and parietal region was greatly improved under careful treatment. The hair was removed, the skin became almost normal in appearance, and there has been no recurrence for two and one-half years. Several cases of vascular nævi were converted into less

¹ Journal of the American Medical Association, March, 1905.

² Zentralblatt f. Chirurgie, 1905, No. 27.

³ Ibid., 1905, No. 32.

⁴ Journal of the American Medical Association, May 13, 1905.

obtrusive defects, the color fading to a pink and the skin becoming smooth and soft.

Fibrochondroma of the Upper Jaw. Donald Hingston¹ reports an unusually large tumor of the upper jaw. The patient gave a history of trauma eight years before the development of a small hard mass; the tumor was painless at first and was situated behind the alveolar margin opposite to the second left incisor and canine teeth, both of which were carious. The tumor gradually increased in size, became painful, and finally discharged pus and a sequestrum. Successive abscess formation took place for a period of three years, during which time the patient lost much strength, the tumor grew to the size of a man's head and protruded from the mouth. The surface of the growth was irregular and divided into lobes by deep sulci. On operation the mass with a large portion of the superior maxilla was removed. The tumor weighed three and one-half pounds, was hard and so divided by a sulcus as to suggest that each half of the tumor arose from outgrowths from each superior maxilla. Microscopically the clinical diagnosis was confirmed, the tumor being an osteoid fibrochondroma, although in one portion there was a cellular arrangement suggestive of sarcoma.

OSTEOMA OF THE UPPER JAW. In connection with his remarks upon osteoma of the orbit Vischer² describes three cases of osteoma of the upper jaw. These growths are in reality the result of an inflammatory hyperostosis rather than a distinct new formation. The causes of the hyperostosis are given as trauma, caries of or retained teeth, although in many cases the tumor arises spontaneously, without pain, and is first noticed when the face begins to be distorted. Since the majority of these tumors occur during puberty, out of thirty-four cases, twenty-six were before the 20th year of life, many authors believe that it is a distinct disease, and have tried to explain it on the basis of a congenital displacement. The prognosis is good when the growth is spontaneously arrested; then the projecting parts may be chiselled away, and if a recurrence takes place this procedure is repeated until the growth ceases. Resection of the upper jaw is indicated only when the tumor encroaches upon the eye.

Fractures of the Lower Jaw. The ideals aimed at in the treatment of fracture of the lower jaw are, first, accurate reduction of the fracture, secondly, the maintenance of reduction and immobilization of the fragments, thirdly, provision for the proper hygiene of the mouth; and lastly, to meet these indications with the least possible disturbance of the oral and maxillary functions. The splint devised by Matas³ may, in his

¹ Montreal Medical Journal, July, 1905.

² Deutsche Zeitschrift f. Chir. Band. lxxvii., Heft 1-3.

³ Annals of Surgery, January, 1905.

opinion, be adapted to the majority of fractures of the lower maxilla, and meets the wants of the average case. The splint is described as follows: It is constructed on the principle of a clamp which holds the entire projecting arch of the jaw from the chin to the angle firmly in the grip of a flexible mouth piece, which fits like a gutter over the entire dental arch, and, of an external plate or chin-cup, which extends from the symphysis to the angle. The mouth-piece and chin-plate are both detachable; the chin cup is made adjustable to various degrees of prognathism by a sliding joint fixed by a pin and thumbscrew. The mouth-piece, horse-shoe in shape, is hollowed in three planes to fit loosely over the crowns of the teeth. The flexibility of the metal allows the splint to be adjusted to the varying contour of the lower dental arch. The splint is made in three different sizes. The chin-piece is made of perforated aluminium and is shaped to fit the contour of the jaw, and is moved backward or forward on a sliding joint. The clamp which the two pieces together consists of an upper and lower limb screwed together in front of the mouth. The upper limb projects from the middle of the mouth and is so curved over the lower lip, that the mouth can be closed and dribbling prevented, at the same time eating and drinking is made possible. The pressure required to hold the jaw firmly in the grasp of the two pieces described, is obtained by a screw attached to the upper limb of the clamp. To apply the splint, the contour of the dental arch should be restored after the reduction of the fracture, the bone held in place by combined internal and external manipulation, and a properly fitting metallic gutter fitted on the arch of the teeth. In case of missing or loose teeth the gutter should be filled with dental wax. The outside clamp is now adjusted after carefully padding the chin, the chin plate applied and the clamp tightened. The patient is taught to irrigate the mouth, which should be thorough and frequent. In case of marked contusion of the soft parts the tension of the screw should frequently be relaxed to prevent pressure necrosis. Immobilization can in these cases be secured by a Gibson bandage until the swelling has subsided.

CYSTS OF THE LOWER JAW. Cysts of the lower jaw are classified usually under three heads, (1) the true dentigerous, (2) the dental, and (3) the multilocular cysts. Barrie¹ reports a case of the true dentigerous type, in which the cyst formed a bulging mass on the posterior surface of the symphysis, extending from molar to molar on either side and destroying the normal outline of the bone. The lower left canine tooth had been extracted, and through the opening, thus left, a cavity 4 cm. on either side could be felt with a probe; anteriorly, the bone and

¹ *Annals of Surgery*, September, 1905.

periosteum were destroyed. At the operation a necrotic cavity was disclosed in the anterior portion of the mandible, extending from the alveolar margin above to the protuberentia mentalis below, and laterally so far as the tissues of the wound could be retracted on either side. The periosteum and bone were completely destroyed. The jaw was sawn through at the second molar on the right and the last molar on the left side, after the necessary teeth were extracted, and the wound in the mucous membrane sutured. Gold crowns were afterward fitted on the remaining teeth, two on the right and one on the left; to which were soldered two strands of heavy platinum wire, bent to the shape of the mouth. This prosthetic appliance acted as a splint, and prevented the lower lip from falling in and the stumps of the bone from being drawn toward the median line. Four weeks later the wire frame was encased in a rubber plate, and later it was intended to introduce a plate with teeth.

The chief difficulty in operations of this character has always been the prevention of the inward contraction of the stumps. For this purpose various forms of artificial jaws have been constructed, but Barrie believes his plan simpler than any so far devised. Its use is limited to those cases in which teeth remain to which the crowns can be attached. The pathological report is likewise interesting in so far as the cyst described is the only one on record possessing a lining composed of adamantine epithelium. The location of the growth is also unique, being the only case recorded of a dentigerous cyst of central location, all others being situated on one side or the other.

Contracture of the Jaws. There is probably no more distressing deformity than the contracture and re-tracture of the jaw which follows as a result of long and persistent ulceration of the mouth, especially when associated with more or less destruction of the inferior maxillary bone. Owing to the inability to open the mouth, and to use the jaw, the growth of the bone becomes arrested and it does not develop proportionately with the other bones of the face. The disfigurement which results is a permanent one, and a very serious handicap to the patient throughout his life. Any operation which can be done for the betterment or relief of this condition should be promptly performed. The earlier the operation is performed in the life of the individual, that is before the age of puberty, the better will be the cosmetic results. The principles which govern these operations are practically the same which apply to plastic operations in lesions where the deformity is due to the presence of cicatricial tissue. The cicatricial tissue must be entirely removed and the defect thus created covered with healthy skin and mucous membrane.

A patient of Falcones had an attack of smallpox when a child, one of the pustules arising on the buccal mucosa caused a chronic ulcer which healed only on cauterization. This led to inability to open the mouth and finally to permanent contracture.

The following operation, devised by Alessandri,¹ was performed: The cicatricial tissue and adhesions being divided, a trapezoidal flap with its base pointing upward was dissected from the lateral surface of the neck. When the anterior surface of the jaw was reached, the oral cavity was opened and the flap drawn into the mouth. The raw surface of the flap was brought in apposition with the denuded surface of the cheek; the external angle of the flap sutured in the superior cul-de-sac of the mouth, and the anterior margin to the labial mucosa. Difficulty was experienced in suturing the upper margin at the internal angle of the flap; to bring the edges of the wound into apposition it was necessary to use a suspensory suture, which was passed through the internal angle of the flap, brought out and tied on the external surface of the cheek. At the end of ten days the pedicle was severed and the flap secured more firmly in the mouth. The denuded surface on the neck can be covered by means of a second flap, or simply by bringing the edges of the skin together as in the present case. The result of the operation was all that could be hoped for from a cosmetic standpoint, and the patient was able to open the mouth without difficulty.

Post-operative Parotitis. Post-operative inflammation of the parotid gland is apt to occur on the fifth to seventh day after abdominal sections; the temperature rises suddenly and other symptoms of inflammation soon appear. The abscess should be opened by Hilton's method although in some cases but a small amount of pus is obtained. The mortality is 30 per cent. in cases where no infection exists at the site of primary operation; in Wagner's² five cases, a purulent bronchitis and lobar pneumonia acted as fatal complications. The infecting organism comes beyond doubt from the mouth and the seat of its activity is determined, as Pawlow has shown, by the arrest of glandular activity during the operation. Berth believes that chloroform narcosis causes an arrest of the glandular function, while ether according to Ruttermann causes first a hypersecretion but afterward an arrest of the secretion. To these etiologic factors Wagner adds the injury caused by the pressure of the anæsthetizer's finger, and recommends also thorough disinfection of the mouth, before the operation, as a prophylactic measure.

ANGIOMA OF THE PAROTID. Because this lesion is a rare one, and because the histological findings of these tumors has rarely been de-

¹ *Riforma Medica*, August 26, 1905.

² *Zentralblatt f. Chirurgie*, 1905, No. 28

scribed, the following case is of interest: the microscopic examination may help to explain the confusion which frequently exists between a simple hypertrophy of the parotid and deep angioma. The patient five months old, had a tumor of the right parotid region, which appeared one month after birth; the growth was irregular, soft, and extended toward the cheek, there was no pain on pressure and no paralysis. The diagnosis of angioma was made and excision determined upon, the operation being attended with some difficulty as the mass was adherent to the parotid, and several nerves had to be divided without however causing any marked paralysis. The extirpated tumor macroscopically did not differ in appearance from that of a simple hypertrophy, but even with the aid of the microscope the diagnosis was not unattended with difficulty. According to Ziegler this similarity is due to the fact that the bloodvessels, because of their emptiness and resulting contraction, are reduced in calibre. If the cells on the vessel walls are radiated, still greater confusion will exist. The diagnosis is made still more difficult if the section is fixed in solutions, which dissolve out the blood. Hardouin¹ found also in this tumor abnormal lobules in which the capillaries had dilated to such an extent that they occupied as much space as the tumor, which had become displaced and atrophied. In the specimens examined no glandular tissue was found, and the excretory canals alone seemed to be normal. The author believes that simple hypertrophy is rare, and that only the most careful examination will show the true nature of the tumor. He prefers excision to electrolysis or cauterization.

ORAL TUBAGE AS A MEANS OF NARCOSIS. The history of this method of producing narcosis and a description of the various instruments used has been dealt with by Franz Kuhn.² The author describes the apparatus he has devised as follows: The tube through which the anæsthetic is given is made of metal, shaped according to the normal curves of the trachea. The lower end of the metal tube is enlarged after the manner of an intubation tube to prevent slipping into the larynx. This portion rests on the aryepiglottic folds, it should be as thin as possible and contain a wide lumen to allow full entrance of air. The tubes come in graduated sizes corresponding to the age of the patient. The guide is made of wire, with an acorn tip, and should have full motion within the metal tube. Introduction can be accomplished under local anæsthesia, or when severe operations follow, under narcosis. The former is easier because in the conscious patient the epiglottis is easier to find and the danger of suffocation after the use of

¹ *Revue de Med.*, March, 1905.

² *Deutsche Zeits. f. Chir.*, February, 1905.

cocaine and without narcosis is slight. The introduction of the tube resembles practically that of intubation, and is far easier than the use of the bronchoscope. If the tube becomes blocked with secretion, which may happen if it is inserted too far, it must be cleaned; either a cannula or brush may be used, or the mucus sucked out by means of a pump. Oral tubing has been recommended by Kuhn for the following reasons: A small amount of chloroform is required because of the direct action of the drug, the patient can be anesthetized in a comparatively short time, and can be brought almost immediately under the effect of the drug, in the event of partial recovery from the anæsthetic the operation is not delayed.

Overdoses are not likely because of the complete and ready control of the narcosis. Gagging and vomiting are rarely met with, and if the latter should occur the danger of aspiration is precluded by the presence of the laryngeal tube. In case the vomiting is clearly mechanical, a sponge or tampon can be inserted in the pharynx, which not only controls the vomiting but secretion as well; the danger arising from sudden vomiting is guarded against by pressure upon the tampon. Tubage guarantees absolutely the integrity of the upper air passage. As soon as the tube is introduced spasm of the glottis ceases, and the anaesthetizer does not have to regard either the tongue or the position of the jaw. Previously, tracheotomy was done in cases where pressure on the trachea existed, as in struma operations. Such patients can now be narcotized by the tubage method and the danger of a tracheotomy obviated. In operations on the nose or mouth, there is no danger of blood being aspirated, the interruption in the administration of the anæsthetic is avoided, and the field of operation is not obscured by the presence of an inhaler. Artificial respiration and the direct introduction of air or oxygen can be readily carried out in cases of emergency, regardless of the blood which may be in the mouth. The control of vomiting and gagging is important in abdominal operations, where complete relaxation of the muscles is required; the tube keeps the glottis open and the straining ceases after the tube is introduced. The tube may remain *in situ* for several hours, when passed through the nose; gagging, however, may occur if it is allowed to remain when passed through the mouth. Some transient hoarseness and tenderness may follow the intubation. Frequently the presence of the tube produces a simple erosion which readily heals, grave injuries have never been known to occur. The author concludes his article by a report of a series of cases in which he has used oral tubage, the results of which, he believes, justify the advantages which he claims.

Ranula. A tumor situated on the floor of the mouth may be an echinococcus cyst, a lipoma, a cavernoma, a dermoid or a ranula. The

origin of all but the last is clear; true ranula arises from either the sublingual gland or the thyroglossal tract. A cyst developing from the latter is described by Försterling.¹ The patient developed a swelling on the neck which gradually increased in size, however not causing any discomfort. The tumor in the midline between the hyoid bone and the thyroid notch was the size of a pigeon's egg, cystic, and without involvement of the overlying skin. The foramen cæcum was abnormally large but an attempt to introduce a probe was unsuccessful. At the operation the cyst was found under the thyro-hyoid muscle and was easily shelled out of its capsule, and its duct was traced to its termination above the hyoid bone.

Microscopically the cyst wall was composed of connective tissue, the lining membrane of which was provided with cylindrical epithelium and in places with ciliated epithelium. In a considerably thickened spot a group of follicles containing thyroid tissue were found; the contents of the follicles resembled colloid material. The *anlage* of the thyroglossal tract can persist as a fistula in the neck; the latter formerly was believed to arise from the hyoid bone because it could not be traced any farther. Schlange first demonstrated that the fistulous tract pierced the hyoid bone, and often continued as far as the root of the tongue. That this *fetal anlage* may persist as a cystic formation, is well illustrated by the case just cited. These cysts may be situated in the neck, or in the tongue, where they are usually small. Cysts arising from the thyro-glossal tract are found on the posterior portion of the under surface of the tongue, while those springing from the sublingual gland are to be sought directly in the floor of the mouth near the margin of the jaw. In the course of operation the difference is more readily seen for cysts arising from the sublingual gland are usually attached to it, and often so firmly that the entire gland must be removed with the tumor. On the other hand, cysts of the thyro-glossal tract are situated in the substance of the tongue and sometimes send projections toward the foramen cæcum or the hyoid bone. A microscopic examination will show the origin beyond doubt, for the cysts of glandular origin do not possess a regular epithelial lining, but a layer of cells degenerated and round in form. The thyro-glossal formations are almost always lined with cylindrical epithelium which in many places shows cilia. Försterling does not agree with v. Hippel that thyro-glossal cysts are so rare and supports his views with the following statements: 1. Heretofore sufficient stress has not been laid upon the microscopic findings. 2. Cysts in the mouth are not apt to break through its floor, when there is practically no resistance toward the mucous membrane. Such mucous

¹ Arch. klin. Chir., Band lxxvi., Heft 3.

cysts cannot rightly be regarded as coming from the sublingual gland. 3. The number of reported cases is increasing. To the cases already collected, the author adds the fifteenth: This tumor consisted of two cysts, one being included within the other, a large ciliated epithelial cyst in whose wall was embedded a squamous epithelial cyst. The former, judging from its position from the operative and microscopic findings, sprang from the thyro-glossal tract. The squamous epithelial cyst, which from its appearance and contents gave the impression of a dermoid, probably arose from ectodermal cells of mesobranchial origin. These cells became displaced and accidentally developed near or in the ciliated epithelial cyst. The squamous epithelium developed exactly as does that of the surface of the tongue, while the ciliated variety retained the appearance of the persisting thyro-glossal tract.

Radical Operation for Epithelioma of the Tongue. There is probably no more malignant lesion that the surgeon is called upon to remove than carcinoma of the tongue. Even though in many cases operations are performed at a very early date there is both a high rate of mortality and a high rate of recurrence. It is generally estimated that at least in 80 per cent. of cases there is a recurrence usually in the lymphatic glands. It is of importance therefore if an operation is undertaken that it should be performed in the most radical way, and Butlin's technique should, I believe, be adopted in every case. Butlin¹ recommends a thorough removal of all the tissues in the anterior triangle in all cases. In this operation he removes the lymph-nodes, the submaxillary glands, connective tissue, veins, fat, the platysma, part of the omohyoid muscles, and occasionally a portion of the external carotid artery and internal jugular vein if surrounded by infected nodes. The structures are reached in the following way: A long incision is made parallel with the anterior border of the sterno-cleido-mastoid muscle, a second one extending from the symphysis meets the first at about its mid-point, and forms two triangles. The skin is then stripped back, the sterno-mastoid retracted, and the tissues removed *en masse* so that the muscles, large vessels and nerves are exposed and are left without a covering. The author advises clamping and ligature of each vessel before cutting in order to avoid hemorrhage. The dissection being completed and the vessels tied, gauze is inserted between the jaw and the submaxillary gland, between the parotid and the vessels, and the ends brought out at the lowest angle of the wound. The following day the gauze is removed and a drainage tube which was also inserted is left behind; healing as a rule takes place by the end of the third week. Butlin has performed twenty-eight such operations with four deaths. Of fourteen cases

¹ British Medical Journal, February 11, 1905.

which were traced, four died with glandular metastasis without local recurrence, and ten are well for a period of three years or more after the operation.

Struma Baseos Linguae. Two cases of this character were operated upon in Hochenegg's clinic and reported by Meixner.¹ The first concerned a twenty year old girl who had complained for four months of pain in the throat. A tumor, the size of a chestnut, was situated exactly in the median line at the base of the tongue and was excised after the glosso-palatine arch was divided. Four months later the patient complained of ringing in the ears, insomnia, weakness and amenorrhœa. The second case was that of a child who had been drowned shortly after birth, and who showed at autopsy a tumor the size of a hazelnut; the growth was so situated as to interfere with respiration. On examining the thyroid region, absence of the normal thyroid was discovered. The microscopic examination of the mass of the tumor in both cases revealed thyroid tissue; in intimate relation with this tissue were numerous mucous glands, and remains of the thyro-glossal duct. Of the cases so far observed the tumors have been of a benign nature. Operation for this condition has been undertaken in various ways; the tumor has been extirpated from the mouth after a median incision of the mucous membrane; from the cheek by Kocher's method, and Langenbeck does a temporary resection of the lower jaw. That the operation is not without danger is shown by the cases of Chanisso, in which symptoms due to the absence of thyroid secretion developed; the administration of thyroid extract, however, was followed by some amelioration.

Carcinoma in and about the Mouth. Carcinomatous lesions of the mouth may be divided into two classes: first, benign conditions liable to malignant degeneration; second, those in which the characteristics of cancer are already evident. In the first class are included leucoplakia, warts, ulceration, fissure, and tubercle; of the benign affections leucoplakia resists malignant degeneration the longest, in some instances a period of twenty years has elapsed before such patches have shown carcinomatous changes.

Farrar Cobb² and Simmons report the results of ninety-two cases of cancer observed during a period of eight years. There were seventy-one males and twenty-one females, almost all used tobacco or alcohol and many gave the history of primary trouble with the teeth. The average age was fifty-four and one-third years. Taken by decades that from fifty to sixty gave the largest number of cases, sixty to seventy was next and the decade from forty to fifty third. The extremes in age

¹ Deutsche Zeitschrift f. Chirurgie, Band lxxviii., p. 1.

² Boston Medical and Surgical Journal.

were seventy-four years and twenty-one years. The operation consisted of everything from a simple curetting or excision of the tumor, to a complete removal of the tongue or jaw, with an extensive dissection of the triangles of the neck. Six patients died soon after the operation, giving an operative mortality of 10 per cent., excluding one case of purulent peritonitis which had no connection with the operation, the mortality was 8.5 per cent. There are eight cures following operation, all of the patients being alive and well to-day, the time from the date of operation varying from four to fourteen years. The life of the patients operated on was longer than in those not operated on, thirty-three of the former living over one year, to nineteen of the latter; those living over one year were twenty-three against five. In fifty-four cases of cancer of the tongue the immediate mortality was 8.5 per cent.; thirty-four cases being operated upon, four are alive and well, two, thirteen years, one six years, and one four years after operation. The percentage of cures of the original carcinoma is 14.3 per cent. the patients all being over sixty. Of the eight cases of *cancer of the tonsil*, in two of which an attempt was made to remove the whole growth, all died. There were fifteen cases of cancer of the upper jaw, and of those eleven were operated upon and all survived the operation. The cancer arose either from the antrum or the alveolar process, and the average length of life of the patients operated upon was 38.75 months. Two of the nine patients died within a year, one lived three years, two lived four and a half years, and one is alive to-day, eight years after the operation. Of cancer of the lower jaw there were fifteen cases, twelve operations, and all but two died.

With *sarcoma of the mouth* the results of operative intervention were somewhat better; in those that recovered the sarcoma was of a less malignant type, while all cases of round and spindle-cell sarcoma terminated fatally. Of ten cases of epulis, giant-cell sarcoma, all recovered, although a secondary operation was necessary in two instances. Of five cases of sarcoma of the tonsil four were operated upon, one was cured and in two life was prolonged five to six years. Of sarcoma of the upper jaw, five cases were operated upon and two are alive; while of seven sarcomata of the lower jaw three are living and well.

Conclusions. The results of these cases show that a certain number of cures may result from the operation, although the prognosis of carcinoma of the mouth is always grave. The malignancy of the disease diminishes with the increase of age. Cancer of the tonsil is the least unfavorable for operation, because of the difficulty or impossibility of removing all the malignant tissue. Following carcinoma of the tonsil, that of the lower jaw appears the most malignant; the growth recurs soon after operation and death ensues within a year. In carcinoma of

the upper jaw, life is prolonged more than in any other form of malignant disease of the mouth.

Tumors of the Soft Palate. The three tumors of the palate removed by Coenen¹ proved, upon microscopic examination, to be epithelial tumors of glandular origin. The author believes these tumors arise from cells of the outer blastodermic layer, the cells which originally were concerned in the formation of the mucous glands of the palate, but for some cause become cut off and remain latent in the tissues as a congenital tumor-anlage. This formation simulates in its growth a salivary gland and therefore must be classified as an adeno-carcinoma. In a supplement, a fourth tumor is described, which shows that palate tumors, though appearing to have only a plexiform cylindromatous construction, possess, in certain spots, glandular tissue. Therefore they have the same origin as tumors composed altogether of glands whose cells never lose their glandular character. These tumors show a tendency to remain for a while more or less stationary, but finally show evidences of malignancy and therefore call for a radical operation.

The Opening of Peritonsillar Abscesses. Few operations in the throat are as simple and safe as the evacuation of peritonsillar abscesses; the usual operative procedures however seem to cause considerable dissatisfaction. The attempted evacuation of a quinsy is frequently futile and is always attended with the anxiety of injuring a neighboring vessel. The acute collection of pus termed quinsy, never forms in the tonsil itself, but in the areolar tissue between the tonsil and the pharyngeal aponeurosis. In over 90 per cent. of the cases the pus collection is found above and in front of the tonsil, sometimes posteriorly and in rare cases externally. If untreated, a peritonsillar abscess usually ruptures into the mouth, by breaking through the supra-tonsillar fossa. To locate the abscess, St. Clair² takes a point slightly external to the intersection of a horizontal line drawn across the base of the uvula with a vertical line along the anterior pillar of the fauces. At this point of election, the abscess is opened by a pair of sinus forceps, which are pushed backward and slightly outward, and withdrawn as in Hilton's method. Forceps are preferable to the bistoury because there is no risk of cutting a large vessel, the method is not resented so much by the patient in case the manoeuvre is not successful; furthermore, the operation not being of an alarming nature, the patient's consent can generally be obtained.

¹ Langenbeck's Archiv, Band lxxv., Heft 2.

² British Medical Journal, March 25, 1905.

THE NECK.

Mixed Tumors of the Lacrymal and Salivary Glands. It is well known that the salivary glands are often the seat of certain peculiar tumors, and recently it has been discovered that growths of like nature occur in the lacrymal gland. The origin of these has been a subject of discussion, and Verhoeff,¹ from his study of 5 cases of lacrymal gland tumors, has come to the conclusion that such new formations cannot be looked upon as endotheliomata: first, because of their close connection with the lacrymal gland, an epithelial structure; second, because of the presence of gland-like lumina in the parenchyma; third, because of the presence of a basement membrane of connective tissue beneath the marginal cells in the cylindromatous areas; fourth, because of the presence of cell masses containing pearls, keratohyaline granules, and prickle cells; fifth, because of the occasional presence of spiral fibres between the cells of the parenchyma. The parenchyma of the lacrymal-gland tumors exhibit features characteristic of epithelium. The epiblastic theory of the origin of these tumors is thoroughly in harmony with the embryological development of the lacrymal and salivary glands, the former arising from a solid down growth of conjunctival epithelium, and the latter from the buccal mucous membrane. The stroma of these tumors seems to be an atypical development of mesoblastic tissue, which, under normal conditions, would have formed the glandular stroma, although other writers believe it to be the result of misplaced remnants of the branchial arches. The term "mixed tumors" should be retained, according to Wood, because these tumors, on account of their morphology, cannot be classified with the adenomata or carcinomata. The mixed tumor is the most common of the lacrymal-gland tumors. As an indication of the malignancy of these tumors, in 3 out of the 5 cases observed by Verhoeff it was necessary to remove the contents of the orbit. In Wood's series of salivary gland tumors 55 per cent. were permanently relieved by extirpation, and 33 per cent. were cured at a secondary operation following recurrence. Tumors of the lacrymal gland are more dangerous than those of the salivary, because of the natural passage-way between these tumors and the brain and the danger of pressure effects on the eye. Extirpation should therefore be performed as early as possible, and in order to remove the entire growth it may be necessary to sacrifice the eye.

Woody Phlegmon of the Neck. The diagnosis of this condition is often attended with much difficulty; the diseases for which it has most frequently been mistaken are actinomycosis, tuberculosis, and carcinoma.

¹ Journal of Medical Research, February, 1905

The former is diagnosed with certainty only by microscopic examination, although in general it is more sharply defined than the phlegmonous condition and does not tend to infect the deeper cervical layers. Carcinoma *en cuirasse* or a lymphadenitis carcinomatosa does not develop as rapidly as the phlegmon, and is always secondary to a primary growth. If, however, there is mixed infection with pyogenic organisms the diagnosis becomes more difficult, and one must rely upon the history of a primary growth, because the inflammation may so mask the malignant infiltration that the latter cannot be recognized. In a case reported by Paul Sick¹ the condition began with the appearance of a painful swelling of a lymph node near the angle of the jaw. Later pain on swallowing developed and steadily increased, while the induration of the neck extended. The skin was moderately reddened; the induration was well defined and was confined chiefly to the subcutaneous tissue, which on palpation was distinctly hard and only painful on deep pressure. Excision of a portion of the tumor for diagnostic purposes was not permitted. Under the application of moist compresses the infiltration of the deep parts and the dysphagia disappeared, but the peculiar reddish-white color and the leathery consistency of the skin persisted for some time. Sick believes that woody phlegmon is a chronic inflammation, chiefly affecting the subcutaneous tissues, characterized pathologically by a highly inflammatory reaction of the infected connective tissue, and a rapid decrease in the virulence of the causative organisms; the latter belong to the pyogenic group or to the group of higher fungi. Since œdema of the glottis is sometimes a fatal complication, as in Reclus' case, one should be on the lookout for it, even in cases which appear to be running a favorable course.

Laryngeal Carcinoma. The indications for operation depend largely upon the seat, the duration, and the character of the carcinoma. In cases where the extension of the growth is not great, the infiltration does not affect the paralaryngeal region or the lymph nodes, and there is no cachexia, the best results may be expected after total extirpation of the larynx. When the regionary lymph nodes are infiltrated, but the surrounding tissue free, and when the carcinoma is of such size as to allow of extirpation, then the character of the growth, the presence or absence of metastasis to other organs, must guide one in determining whether the case is operable or not. Such cases, especially if epitheliomatous, do not tend toward recurrence for a considerable length of time after the operation. In von Navratil's² experience squamous-cell carcinoma has been the most frequent form, and next in order of frequency

¹ Deutsche Zeitschrift f. Chirurgie, April, 1905

² Arch. f. klin. Chirurgie, Band lxxvi., Heft 3.

are the basal cell and the horny squamous-cell forms. Of the two varieties of squamous-cell cancer the horny is the more malignant, grows faster, and gives earlier metastasis. The malignancy of the growth varies according to its location, the so-called inner cancer (cancer *intrinsèque*), by which we understand carcinoma, located on the vocal cords, Morgagni's ventricle, the interarytenoidian folds, and in the anterior commissure, grows more slowly and does not give metastasis as early as the external cancer (cancer *extrinsèque*), a term applied to carcinoma of the epiglottis, the sinus pyriformis, and the posterior wall of the larynx.

METHODS OF OPERATION. For either partial or total extirpation, after an inferior tracheotomy performed, preferably several days before, a longitudinal incision is made and the larynx split sufficiently to afford a good view of the interior and enable one to determine whether a total or partial extirpation is indicated. The line of excision should extend, if possible, 1 cm. beyond the boundary of the cancer, and a pedunculated skin flap is sutured in place of the extirpated larynx; the flap must be free from tension and not compress the large vessels. In case a flap is not made, the wound is packed and nourishment for the first few days given by means of an œsophageal tube, or per rectum.

To prevent aspiration pneumonia the trachea is either sutured to the skin wound or closed immediately above the cannula. As to the different forms of operation the endolaryngeal method is indicated when the carcinoma, an "internal carcinoma," appears as a small, completely circumscribed node, and has not given metastasis. Partial extirpation, without narcosis and preliminary tracheotomy, may be done in cases of internal squamous-cell cancer (not horny), in which the growth is not fixed and has not given metastasis, providing the extirpated area does not include more than one-third of the larynx. Partial excision after a preliminary tracheotomy and under general narcosis is indicated when the growth appears as an internal cancer of the squamous or basal-cell type, without metastasis, and when over one-half of the organ must be removed. In these cases the wound is treated as an open wound, and the patient is nourished by the stomach tube for the first seven days. Complete extirpation is performed in the early stage of a horny squamous-cell or medullary cancer without metastasis. The contraindications to this operation are the advanced age of the patient and an extension to the œsophagus of an external laryngeal carcinoma, which upon microscopic examination proves to be of the horny squamous-cell or medullary form. Even if the glands are not involved, operation is useless; in case dyspnoea occurs subsequently a low tracheotomy is advised.

PLASTIC OPERATION AFTER THE EXTIRPATION OF A CARCINOMA OF THE LARYNX AND PHARYNX. The patient was operated on for a carcinoma, which affected chiefly the upper portion of the larynx and the adjacent portion of the pharynx; there was also on the right side of the neck near the larynx, a carcinomatous lymph-node. Three weeks after a preliminary gastrostomy, Helferich¹ excised the larynx and pharynx. The transversely cut ends of the trachea and œsophagus were attached to the margin of the wound, the lymphatic metastasis thoroughly removed, and the pharynx closed by sutures. After the wound had healed, and the patient strengthened by nourishment given through the gastric fistula, a plastic operation for the union of the oral cavity with the œsophagus was performed. For this purpose the pharynx in the upper portion of the scar was widely opened and the missing area between pharynx and œsophagus supplied by a skin flap so placed that the cutaneous surface was inside. The denuded surface was covered simply by drawing the skin from either side together. The function of the œsophagus thus formed proved satisfactory and the patient was able to eat and drink without difficulty. From time to time a bougie was introduced in order to keep the lumen of the newly formed œsophagus patulous. The gastric fistula which was used exclusively for purposes of nourishment during the different operations was now allowed to heal; the neck wound closed completely and only the tracheal opening was left.

Œdema of the Glottis. The so-called œdema of the glottis, which is really an œdema of the epiglottis, affects chiefly locations which contain a loose submucosa—*i. e.*, the under surface of the epiglottis, the false vocal cords, and the arytenoepiglottic folds. Acute inflammatory œdema may develop in connection with local processes, including trauma, diphtheria, and an adjacent inflammatory process, and may be a complication of several infectious diseases. A case, with an unusual result, is reported by Emil Mayer.² The condition began suddenly with pain in the neck and dyspnœa. The symptoms steadily grew worse, being accompanied by intense dyspnœa, cyanosis, and a profuse discharge from the mouth and throat. Laryngoscopic examination revealed a large glistening mass at the base of the tongue, filling the entire right pyriform sinus, and covering the epiglottis to such an extent that but little room was left for breathing. The appearance was that of an œdematous infiltration, which was immobile on respiration, and suggested an acute septic inflammation. After cocaineizing the parts a deep incision was made and a quantity of thick bloody fluid escaped.

¹ Zentralblatt für Chirurgie, 1905, No. 30.

² American Journal of the Medical Sciences, August, 1905.

A 1:5000 adrenalin spray, alternating with steam inhalations, was given, and the urgent symptoms rapidly yielded. A later laryngoscopic examination showed a slough, where the œdematous mass had been, and the portions of tissue subjected to examination were found to contain staphylococci albi and streptococci. The histological examination of the specimens showed no evidence of anything other than connective tissue. Six weeks later the epiglottis, on examination, was in a most unusual state. Fully one-half of the epiglottis had sloughed away and a band of adhesions ran across the lateral pharyngolaryngeal space on the same side; the remaining portion of the epiglottis stood erect, and two bands of adhesions ran between it and the pharyngeal wall. The diagnosis of œdema of the glottis engrafted upon an hereditary syphilis of the epiglottis was made. Since there was no evidence of pre-existing lesions the disease was believed to be of the hereditary rather than the acquired type. The case illustrates the efficacy of prompt incisions in the inflammatory area in avoiding the necessity of tracheotomy, and further proves the value of adrenalin in the after-treatment of these conditions.

The Thyroid Gland. **PHYSIOLOGY.** The researches of Vassale and Generali first taught us that the absence of the thyroid gland was responsible for chronic trophic disturbances and cachexia, while the deficiency of the parathyroid bodies was the cause of the fatal symptoms of tetany.

These views have received important support from the clinical and experimental studies of Pineles.¹ That the function of the thyroid is not absolutely necessary for life is shown in cases in which the gland is absent congenitally; with normal parathyroids such individuals have lived to be thirty-seven years old. Symptoms of tetany, cramps, and spasms are always wanting because normal parathyroid tissue exists. If the condition is reversed—that is, if the parathyroids of animals are extirpated and the thyroid undisturbed—then tetany without cachexia follows; the experiments on cats and dogs gave results of a positive nature, while in apes and rabbits the results were somewhat doubtful; but experience with the removal of the thyroid in man bears out the above assumption. An exact analysis of the cases of tetany occurring after struma operations shows that this complication happens especially when the under pole of the lateral lobe was excised; this is the portion in the removal of which the parathyroids are most easily damaged or accidentally extirpated with the thyroid. This fact is further corroborated by the removal of lingual thyroids, in which the true thyroid is absent; such cases are never complicated by tetany, because, obviously, the parathyroids are never disturbed. Surgically, the thyroid and

¹ Die Grenzgebiete an der Medicin und Chirurgie, Bd. xiv., Heft 1

parathyroid glands must be considered as separate factors, which, because of their important function, must never be completely removed. The parathyroid, because of its usual relation to the lower half of the lateral lobe, will not be disturbed if the middle lobe and the upper half of the lateral lobe only are removed. This relationship may explain the acute and fatal cases of tetany which sometimes follow certain goitre operations.

RETROSTERNAL ACCESSORY THYROID. Accessory thyroids may be divided into the true and false varieties, the latter being attached to the parent thyroid by a pedicle; the true are further subdivided into the free and attached. These accessory glands are distributed over a wide range, extending from the base of the tongue to the aorta; from the spinal column behind to the skin in front, and to the large vessels on either side. Pathologically, accessory thyroids may be affected with the same conditions as the true gland; enlargement with resulting pressure is usually the initial symptom. Collins¹ has operated upon a case of this character; at the primary operation a typical cyst of the thyroid was found and removed, the cyst possessed a prolongation extending backward along the right side of the trachea and œsophagus. At the end of a year's time the patient was far from improved; the sinus had persisted and discharged pus copiously. On probing it was found that the sinus extended backward for two inches and a half and terminated in a cavity from which several spiculæ of bone were removed. At the second operation, the sinus was dissected out; below it, and in relation with the œsophagus and trachea on the right, the arch of the aorta in front, and displacing the left common carotid, was a large mass. This mass was not connected with the thyroid in any way, and on section was found to be composed of pure thyroid tissue with many colloid cysts and calcareous deposits. Collins was able to find on record but three retrosternal accessory thyroids which had undergone the pathological changes described, and believes that such formations may not uncommonly demand surgical interference.

INTRATRACHEAL STRUMA. Only 14 cases of this nature have been so far reported. Pfeiffer² describes a case in which dyspnœa was a prominent symptom and which on any exertion became greatly intensified. Laryngoscopic examination revealed a tumor the size of a cherry on the posterior wall of the larynx. This growth was removed by a median incision splitting the larynx and trachea. The wound was closed above and a tracheotomy tube inserted in the lower angle. The defect caused by the removal of the tumor was not covered, but was left to heal by

¹ *Annals of Surgery*, May, 1905.

² *Beiträge zur klin. Chirurgie*, Bd. xlv., Heft 3.

second intention. Histologically, the growth was composed of thyroid tissue with colloid retention; the thyroid gland itself did not show any evidence of change. The struma was probably a variety of accessory thyroid which, projecting itself between the tracheal rings, made its appearance beneath the mucosa of the trachea.

ACUTE POST-OPERATIVE THYROIDISM. This condition, closely resembling acute exophthalmic goitre, is found most frequently following thyroid ectomies and is recognized as one of the grave dangers of these operations. Cases of acute thyroidism following nervous shock are rather common, but the post-operative variety is very rare. Sanderson¹ was able to collect but 5 cases from the literature. The case observed by him was operated upon for chronic appendicitis; prior to the operation no symptoms of exophthalmic goitre were noted, beyond some nervousness and a tendency toward pigmentation of the skin. At the beginning of anaesthetization and throughout its course the pulse rate was high, 168 per minute, and it was noticed at the same time that the thyroid was engorged and enlarged. For the first thirty hours after operation the pulse rate increased in rapidity, at one time it was 220, although the mean rate was 170. The temperature was at no time alarming, and the condition gradually improved. Digitalis was given by enema, digitalin and strychnine by hypodermic injection, and when the patient's condition was most critical, fluid extract of cactus grandifloris was given in ten minim doses every four hours. This treatment was continued for many days. The patient finally began to improve, and, although he gained in strength and weight, yet mild symptoms of Graves' disease persisted. Sanderson believes that in many cases the precise nature of the complication is not unrecognized. The affection is a dangerous one, only 2 out of 6 cases recovering. The condition is characterized by tachycardia, enlarged thyroid, nervousness, and a tendency toward blushing, exophthalmus and pigmentation or alteration of the skin.

STATUS LYMPHATICUS AND THE DUCTLESS GLANDS. This term is applied to the pathological condition associated with the perverted function of the ductless glands and with the disturbance of the normal proportion of their internal secretion. Roswell Park² considers the subject important because it has so much to do with the question of the toleration of anaesthetics and the matter of wound repair. Sudden deaths during and after operation are to be explained, in some cases, by the presence of this abnormality; those cases attributed to the anaesthetic or the anaesthetist might be guarded against by a more careful study of the diseased condition. There is a positive although obscure relation exist-

¹ American Medicine, February 4, 1905.

² Transactions of the American Surgical Association, July 5, 1905.

ing between the lymphatic system and the lymph-making organs and the ductless glands; lymphoid tissue increases throughout the body as the thymus normally disappears. However, it is the hypertrophy of the gland which is of interest surgically, for in cases of sudden death the thymus is usually enlarged. Strange as it may seem, there exists a relationship between the pituitary body, the thymus, the thyroid, the parathyroid, the coccygeal body, the testes, the ovaries, and possibly the bone-marrow. The life history of the thymus is closely related to that of the testes; atrophy of the former seems to depend upon complete maturation of the latter. Thymus extract produces in animals a fall of blood pressure with acceleration of the heart's action, and in fatal doses collapse. Enlargement of the gland may produce death by pressure on adjacent structures.

CYSTS OF THE THYROID GLAND. Some cysts of the thyroid produce symptoms which correspond to those of exophthalmic goitre; these symptoms develop after the appearance of the tumor and disappear after its removal; other cases may not experience any difficulty beyond that resulting from the mere presence of the tumor. Cysts occur most commonly in the decades between ten and forty years, in which period they are fairly evenly distributed. The duration in Bloodgood's¹ series varied from two weeks to fifty-three years, and in only six cases had the tumor persisted less than one and one-half years. There is no exact relation between the size of the cyst and its duration; tumors of long duration may exhibit variations in size. From the clinical history Bloodgood has not been able to trace any relationship between the onset of the cyst and puberty, pregnancy, or the menopause; the tumor has moreover arisen in glands of comparatively normal appearance. After studying 24 cases, he was unable to draw any positive conclusions as to the etiology of the cysts, but was not impressed with the usual explanation that hemorrhage is the causative factor. In many cases the histological evidence of hemorrhage was not present, while it was found quite frequently in simple goitre without cyst formation. If hemorrhage were an important etiological factor it would then be strange that cysts were not more common in simple goitre. It seems easier to explain the origin of the cysts on the ground that they begin in a solid adenoma; in the growth of the latter the central dilated colloid alveoli coalesce and a cavity is formed by the degeneration of the colloid material and the lining epithelial cells. The surgical treatment of thyroid cysts should be enucleation when small, or, if an entire lobe of the gland is involved, by extirpation of the lobe. In this group of cases there was no serious

¹ Surgery, Gynecology, and Obstetrics, August, 1905.

post-operative complications, and so far no recurrence of cyst formation in the remaining thyroid tissue.

Echinococcus of the Thyroid Glands. Even after the examination of the specimen removed at operation, it is not safe to make a positive diagnosis of primary echinococcus infection of the thyroid, for there is always a possibility that the gland was secondarily involved from the mediastinum. In 22 published cases the diagnosis in but 1 was made before the operation. Ehrhardt¹ endeavors in all cases to extirpate the entire sac, and when that fails, the parasites are removed and the sac walls sewed together, after the cavity is filled with iodoform emulsion. Ehrhardt reports a case in which the cyst was situated in the anterior mediastinum behind the sternum. The tumor, as large as a hen's egg, was adherent to the isthmus of the thyroid and both lateral lobes. The wound had closed twelve days after removal of the cyst.

CARCINOMA OF THE THYROID. Cancer of the thyroid is seen more particularly in regions where goitre is prevalent, occurs more frequently in females, after the fortieth year of life generally, and develops in about 83 per cent. of the cases in a pre-existing struma. Early metastasis of thyroid cancer is especially characteristic, although it may rapidly infiltrate the neck and form a hard tumor with or without glandular involvement. Often the cancer is present in the thyroid and is only recognized when metastasis appears in the lung, bone, or some distant part; this is the intracapsular form. The infiltrating variety leads to compression, displacement, or perforation of the trachea, paralysis of the vocal cords, and displacement of the œsophagus. A growth of this variety was extirpated by Latronche and Chavier.² The operation was very difficult because of the strong adhesions between the tumor and the laryngo-tracheal tissues; the growth pressed upon the trachea and sent a prolongation between the trachea and œsophagus, to which it was adherent. The tumor was removed without injury to any of the important cervical structures and the left lobe of the thyroid, although appearing normal, was also extirpated.

Cancer of the thyroid never causes myxœdema, even after total extirpation of the thyroid. Symptoms of Basedow's disease from "hyperthyroidation" may develop, especially when there are metastatic lesions. Even in incipient cases, treated by thyroidectomy, the prognosis is grave. Madelung found but twelve recoveries out of one hundred and ten operations. Delorme³ advises operative interference in every rapidly growing struma, especially if the goitre is one sided and of long

¹ Zentralblatt f. Chirurgie, 1905, No. 43.

² Journal de Med. de Bordeaux, May 21, 1905.

³ Zentralblatt f. Chirurgie, 1905, No. 8.

duration; the symptoms of Basedow's disease should be regarded as an indication of incipient malignancy. Compression of the trachea must be treated by such measures as tracheotomy, exothyreopexy and palliative thyroidectomy; the last is preferable because it offers the best prospects for prolongation of life. The incision for tracheotomy when done should go through the tumor mass; the great objection, however, is the unavoidable infection of the wound.

EXOPHTHALMIC GOITRE. Recently so much has been written upon the subject of this affection, so many theories advanced as to its etiology and pathology, that a *résumé* of the essential ideas as generally accepted may not be amiss. The theory of Moebius, that this condition is due to a hypersecretion of the thyroid, was reinforced by the microscopic studies of Greenfield, who discovered that the thyroid in exophthalmic goitre is not only hypertrophied, but secreted under a high pressure. The predominant view at present is that Graves' disease is primarily a disease of the thyroid gland, that intoxication of the rest of the body is the result of hypersecretion, that the toxic action of the latter exerts its influence chiefly on the nervous system, as shown by the cardiac vasomotor and ocular symptoms. Certain predisposing factors are often mentioned as playing an important role, chief among which are the neuropathic hereditary conditions, the female sex, emotion, and shock.

Surgical Treatment. The rational treatment of exophthalmic goitre consists in the adoption of such measures as will decrease the amount of glandular secretion (thyroidectomy or ligation of the thyroid arteries), or in the administration of a serum which will neutralize the effects of hypersecretion. The variation in the operative results has been due in part to the varying amounts of thyroid tissue which have been removed or rendered functionless by arterial suppression. The fear of removing too much tissue and thus producing the reverse condition, that of cachexia strumapriya, may account for those cases of only moderate improvement. Secondary operations, however, may relieve the symptoms in some instances; in fact some operators, notably Kocher, prefer to perform their thyroidectomies in several stages; a preliminary ligation of the arteries may be done at the first sitting, to be followed later by a partial extirpation of the gland. The latter seems to be the operation of choice, and the one which has given the best results in the greatest number of cases. While surgical intervention in exophthalmic goitre is a well-established procedure, yet this measure should not be resorted to indiscriminately but only in selected cases, because the operative mortality is high (17 per cent.); because some cases are benefited by medical or x-ray treatment and some cases recover spontaneously. In general it may be said that operation should be reserved until other

measures fail; that surgical measures should not be postponed until the condition becomes desperate; and that operation is particularly indicated in exophthalmic goitre engrafted upon a colloid struma. As already stated, the operation of thyroidectomy has given results somewhat better than resection of the cervical sympathetic. The results of this operation in the larger clinics can be tabulated as follows:

	Cases.	Cured.	Improved.	Deaths.
von Mikulicz	18	10	7	1
Krönlein	24	16	6	2
Kocher	59	15	10	1
Schultz	20	18	1	1
Friedheim	20	14	5	1
Hartley	15	14	..	1

According to Hartley's¹ statistics, the average per cent. cured has been about 71; improved, 9.6; unimproved, 6.4, and fatal, 12.6 per cent. Balacescu² has collected in all 53 cases of *division of the cervical sympathetic*, of which 37 recovered, 43 improved, 9.4 were unimproved, and 11.6 per cent. died. It can thus be seen that the number of cures in thyroidectomy is far greater than in sympathectomy, and that the number of deaths is about equal in the two operations. From these facts, and the advantage gained by the ability to perform the former operation under local anæsthesia, most surgeons prefer thyroidectomy. Kocher insists upon the use of local anæsthetization in all his operations in order to avoid the risk of sudden death or asphyxia.

Serum Treatment of Exophthalmic Goitre. Of late years efforts have been made to perfect a serum for the treatment of this affection; it is believed that thyroid products normally neutralize certain toxic substances, and when these products are not neutralized they in turn become toxic. If it were possible, therefore, to collect the toxic substances which the thyroid normally neutralizes, it might be possible through their administration to control or neutralize the products of excessive thyroid production.³ This theory has been utilized by numerous investigators, and material was obtained by first removing the thyroid from goats or dogs; when the blood of the animal was then full of unsaturated toxic products it was killed and the serum obtained used for therapeutic purposes. Lanz has discovered that the milk of goats which have had their thyroids removed contains these toxic substances, and, as goats live for a long time without their thyroids, fresh milk can be obtained daily. If the milk proves distasteful the toxic substance can be given in solid form, such a preparation having been made from the pre-

¹ Annals of Surgery, July, 1905.

² Arch. klin. Chirurgie, Bd. lxxvii.

³ Medicine, September, 1905.

precipitation of the milk. In most cases no very decided change has been noted, the serum must be administered for a long time, although some improvement may be seen in the course of a few weeks. Kuh's¹ experience with 11 cases demonstrated that while the serum is not a specific it may be considered an excellent palliative remedy. The patients became less nervous, their appetite was improved, they gained weight and the tachycardia responded more promptly to the serum than to any other remedy. The administration of the serum, or a precipitate thereof, before operative measures, has been advocated by S. Christens.² In eight cases thus treated the general condition of the patient was improved, although the objective symptoms, goitre, exophthalmus, and tachycardia, were not appreciably affected.

Röntgen Ray Treatment of Goitre. The x-rays have been used in both simple and exophthalmic goitre, and that the former is influenced by the rays is shown by the results obtained in 8 cases described by Görl.³ The length of exposure was five to ten minutes, the distance 10 cm., and the intervals between sittings varied from four days to three weeks. In a remarkably short time the strumas diminished in size; in one instance, after four exposures, the circumference of the neck was 5 cm. less. No disturbance of the patient's general condition was observed. In 2 cases of exophthalmic goitre, but slightly improved by partial extirpation of the thyroid, Beck⁴ used x-rays, in the first case thirteen months, and in the second case eighteen months after the operation. Marked improvement accompanied by a considerable decrease in the size of the gland was noted in both cases. Beck then decided to use the rays on a third case immediately after operation; five months after partial extirpation in this case there were no symptoms of Graves' disease present. The rays probably exert a favorable influence by diminishing glandular activity and reducing absorption by their obliterative effect on the lymphatics.

Thyroid Grafting. Since the inception of the principles involved in thyroid grafting, many cases with strikingly good results have been reported. The disadvantage of the method is the difficulty in obtaining healthy thyroid tissue; suitable material may be secured in operations for simple goitre. The grafts must be taken from a young person, not over thirty, and should be immediately implanted. A histological examination of the grafts may be advisable, although some surgeons, familiar with the gross appearance of the thyroid, are satisfied with a mere macroscopic inspection. The incisions may be made under local

¹ Editorial, Journal of the American Medical Association, January 7, 1905.

² Medizinische Klinik., 1905, No. 5.

³ Münchener med. Wochenschrift, Bd. lii., No. 20.

⁴ Berliner klin. Wochenschrift, May 15, 1905.

anaesthesia, but as cocaine may prove detrimental to the growth of the graft, care must be taken to avoid its presence at the seat of operation. Cristiani¹ applied his method of thyroid grafting to a girl aged twenty-one years, suffering from all the symptoms of myxœdema, with difficulty in breathing. After a partial thyroidectomy to relieve the latter symptom the remaining degenerated glandular tissue had to be removed; this was followed by an increase in the severity of the symptoms. Two years later sixteen pieces of sound thyroid gland were implanted. The grafts were placed in tunnels extending in different directions and were made by skin incisions about 2 cm. long. The evidences of myxœdema disappeared at once in the parts where the grafts were placed. The administration of thyroid extract was continued, as it was found that the patient's health was better during its use. Three months later more thyroid tissue was grafted and the patient improved so that the thyroid extract was discontinued. The grafts are palpable and show every evidence of being perfect neothyroid organs.

Possibly even more brilliant was the result obtained by Gautier and Kummer² in the treatment of a three-year-old cretin. The patient improved on the administration of thyroid extract, but as it brought on insomnia and diarrhoea, its administration had to be discontinued. Accordingly four small pieces of thyroid gland were inserted in the posterior border of the axilla. After the operation immediate and rapid improvement took place, and two months later the patient had been transformed from a state resembling idiocy to a condition, both mentally and physically, normal for a child of her age.

CONGENITAL THYREOGLOSSAL FISTULA. Broca's case was that of a five-and-one-half-year-old girl who, when four months of age, developed an abscess in the middle line of the neck. Incision of the abscess resulted in the formation of a fistula, which has almost constantly remained open, discharging a scanty purulent pus. From the opening of the fistula a tract extended upward and was lost behind the hyoid bone. Suppuration of this distended persistent thyreoglossal tract was the cause of the fistula. To effect a cure the lining membrane must be completely removed, the tract dissected out, especially the portion lying behind the hyoid bone, removing the latter if necessary. Broca³ has not seen in his experience any ill results follow the removal of this bone.

Ligation of the Internal and Excision of the External Carotid for Malignancy. The case on which this operation was performed had a widespread involvement of the floor of the mouth and the entire submaxillary space, due to a recurrence of an epithelioma of the lip. An incision extending

¹ *Semaine médicale*, vol. xxv., No. 8.

² *Revue med. de la suisse romande*, June 20, 1905.

³ *Journal des praticiens*, June 10, 1905.

from the external ear to the symphysis of the jaw, and a second one along the sternocleidomastoid muscle, exposed the entire field of infection. After isolating the common carotid, the internal was ligated and the external carotid with all its branches excised, the infiltrated lymph nodes, the floor of the mouth, and the salivary glands removed. Senn¹ has performed the above operation upon three different patients; on one occasion death resulted in twenty-four hours. This is a modification of the Dawbarn operation, in that, in addition to the excision of the external carotid artery, the internal carotid artery was ligated and the malignant tissue excised. The results which Dawbarn himself obtained with the operation, carried out in every detail in accordance with his own description of it, have been such as to encourage other surgeons to take it up. In 2 cases in which I have practised the operation the immediate results were certainly striking; in one of these cases there was reason to believe that had not the patient died of some intercurrent affection the operation would have effected a cure, or at least would have made possible a subsequent radical operation. This was a case of very large epithelioma involving almost the entire chin. In the other case the immediate results were equally striking, but only temporary, in that in the course of a month or two the tumor began to grow again and assumed its former state of malignancy. No criticism should be made of the Dawbarn operation unless it is carried out in every particular, as Dawbarn himself has described it. If there is any variation in the technique, or if all the requirements of the operation have not been fulfilled the operation must not be held responsible for a failure to obtain permanent results. The most important feature of the operation, it seems to me, is the injection of paraffin. It is by this means that many of the possible channels for a collateral circulation are shut off.

Spasmodic Torticollis. Spasmodic torticollis is the most resistive form of tic known and the only one in which the tic is consistently tonic. The prognosis as to cure is grave because of the neuropathic constitution of the patients and the nature of the disease. Patrick² has obtained the best results in the treatment of children who respond readily if properly handled. Any sensory disorder which may be the cause of the tic is first removed, the patient is then hypnotized and taught to practice systematic stimulation of inhibition, which constantly reminds the child of its tic. In adults, although the treatment is based on the same principles, the results are not so encouraging. Operative results have on the whole proven unsatisfactory, owing to the fact that the process has

¹ Transactions of the Chicago Surgical Society, March 6, 1905.

² Journal of the American Medical Association, February 11, 1905.

been erroneously looked upon as a local spasm and that paralysis of the contracted muscles will render the movements impossible. The disease being a physiological and not an anatomical hyperkinesia, no operation yet devised can abolish the movements, whether they are made consciously or unconsciously by the patient. The cures reported were not brought about by any induced paralysis but rather through the psychic influence of the operation; in some cases the condition has been aggravated by operation. Patrick believes that section of the sensory roots of the cervical spinal nerves would be a favorable operative measure, although too serious for a disease not dangerous to life. Orthopedic measures have been of assistance in a few cases, but never effected cure.

The system of exercises as elaborated by Meige and Feindel have given promising results in many instances.

The surgical aspects of the treatment of spasmodic torticollis are very limited. The operations which have been performed for the relief of this condition are both peripheral and central. Central operations consist in the excision of the cortical centre presiding over the affected muscles. This operation has been practised only in a few cases, and has never met with the approbation of the surgical profession. If the primary lesion is central, as is believed by some, excision of the cortical centre at first would seem to be the most rational mode of treatment, but from our experience with this operation in other conditions we know how readily adjacent centres of the brain may become educated to assume the function of that portion which was damaged by accident or actually removed at operation. The operation which has given the best results in the treatment of spasmodic torticollis is that which involves the excision not only of the nerves supplying the trapezius and sternocleidomastoid muscles—that is, the spinal accessory nerve—but also the posterior divisions of the first, second, and third spinal nerves, supplying the other muscles concerned in the rotary movements of the head. This operation was first practised by Keen, and has been repeated by him on several occasions. The operation itself is probably as difficult, if not more difficult, than any other operation upon the human subject with which I am familiar, but the results are certainly gratifying in that, if the spasmodic movements are not entirely arrested, they are certainly alleviated. While the operation may not be founded upon a strictly rational basis, the results seem to warrant its recognition and performance.

TORTICOLLIS. This condition is attributed by Kader to an injury to the sternocleidomastoid muscle in some cases, to a hematogenic infection in others, or to a combination of both. Ischemia in connection with other factors is considered without question to play a part in the etiology of

this affection, and Förderl¹ traces the congenital distrophy of the muscle to an intrauterine ischemia caused by compression upon the shoulder as a result of diminution of the uterine space. He believes, moreover, that the entire symptom complex can be explained in this manner. In order to fulfil the functional as well as the cosmetic requirements of a radical operation for wry-neck, Förderl has adopted the following technique, an incision 3 cm. long is made between the two heads of the sternocleidomastoid muscle, the edges of the wound retracted and the clavicular portion of the muscle divided at its insertion. At the same level the sternal portion is divided so that when the deformity is corrected the ends of the detached muscles can be united, preferably with catgut sutures. By this means the clavicular portion of the muscle is lengthened to a considerable degree and deformity is easily corrected after the contracted portion of the platysma and the cervical fascia is divided. The result was so satisfactory that the operation, which corresponds in principle to Bayer's plastic operation upon the tendo Achillis, was repeated in other cases. Fourteen cases were operated upon, the external wound healed promptly, and after the third week further treatment was unnecessary. While this method offers bright prospects for the correction of the deformity, sufficient time has not elapsed in the operator's opinion to warrant its general adoption.

Tuberculous Cervical Lymph Nodes. In presenting his report based upon a study of 100 cases of tuberculosis of the cervical lymph nodes, Dowd² draws the following conclusions: 1. The disease is serious and often leads to tuberculosis of other parts. 2. Thorough removal is better than partial extirpation or palliative treatment. 3. The prognosis is better in children than in adults.

Of 692 cases collected by Demme, treated by constitutional measures, 29.2 per cent. later developed tuberculosis in some other region. These statistics are offered to prove that tuberculosis of the cervical lymph nodes is in itself a serious affection and that the results of non-operative measures are not altogether satisfactory.

As has been pointed out by Most,³ the retropharyngeal nodes are frequently the seat of tuberculosis. The nodes rest upon the buccopharyngeal fascia and in close relationship with the internal carotid artery. The region drained by these lymphatics is an extensive one, comprising the posterior portion of the pharynx, the inner portion of the nose and nasal sinuses, and the Eustachian tube. It can be seen, therefore, how readily these nodes can be infected, be it inflammatory,

¹ Zentralblatt f. Chirurgie, 1905, No. 8.

² Annals of Surgery, July, 1905.

³ Zent. f. Chir., 1905, No. 30.

tuberculous, or carcinomatous in nature. The cervical nodes may become infected from those in the retropharyngeal space in one of three ways: through the lymphatic channels following the facial and internal jugular veins, through the lymphatic channels traversing the submaxillary triangle, or through those along the course of the large vessels.

The anatomical arrangement of enlarged nodes is discussed by Dowd and their position defined by drawings. Operative measures are considered under the following headings: 1. Incisions. 2. Structures to be removed and avoided. 3. Details as to the time and wound treatment.

Dowd prefers the transverse to the longitudinal incision, because it leaves less unsightly scars. Longitudinal scars stretch and frequently thicken, while transverse scars follow the neck creases, do not stretch, and after a time can scarcely be seen. The nodes are to be removed with as little surrounding tissue as possible, in this way avoiding injury to important structures.

Ligature of the Innominate Artery. This operation in properly selected cases is a reasonably safe and undoubtedly useful measure. Suitable cases are those possessing either a circumscribed or globular aneurysm, combined with good physical condition of the patient; while a fusiform aneurysm due to a general arteriosclerosis, with accompanying visceral disease, is unsuitable. The main factor in obtaining a successful result is the maintenance of asepsis. Sheen¹ claims that prior to his case but seven successful operations of this character have been performed. A central incision should be made, and, when necessary, horizontal and vertical division of the manubrium; the carotid artery should be ligated as well as the innominate, silk being the best ligature material. To ensure permanent occlusion of the artery some injury to the inner coats is probably necessary, but with aseptic conditions such an injury can work no harm. Two ligatures, if possible, should be placed around the artery, the first turn of the proximal ligature being held tight, so as to keep back the blood while the distal ligature is completely tied.

Inasmuch as the most frequent cause of death next to sepsis is the direct result of interference with the cerebral circulation, the propriety of ligating the carotid a fortnight before the innominate should be carefully considered. According to Sheen the "Valsalvan" method of treatment prior to the operation is inadvisable.

Cervical Ribs. Cervical ribs develop either from the centre of ossification of the transverse process of the sixth or seventh cervical vertebrae or from a separate centre. They articulate with the body and trans-

¹ Annals of Surgery, July, 1905.

verse process after the manner of the other ribs. They may appear as process-like projections scarcely extending beyond the transverse process, as projections extending an inch beyond the transverse process, with or without a free end, or as complete ribs with sternal costal cartilages. The condition apparently develops in adult life, for out of 29 cases the average age was twenty-seven years. Whether the rib grows from its attachment at the vertebræ, or is an elongation due to the deposition of bone on its tip, has not been proven, although Murphy¹ tends toward the latter view because of the increasing diameter of the rib. The same author explains the absence of œdema by the anatomical relations of the parts involved. The subclavian artery and the nerves are compressed against the scalenus anticus as the rib grows forward; but as the vein is anterior and external to the muscle, it escapes involvement. Murphy also doubts the existence even of the small number of aneurysms reported; in a case of his own he found the artery spread out and resembling an aneurysm, but dissection proved that very little dilatation existed. The symptoms are those resulting from the pressure upon the nerve trunks of the brachial plexus or the subclavian artery and the presence of a tumor in the supraclavicular triangle. Pressure on the nerves causes paræsthesia or paralysis. Pressure on the subclavian artery causes an ischemia and when the pressure is unrelied or increases in severity gangrene may develop. Babcock² has reported a case showing this complication, in which the circulation was re-established after removal of the rib. Murphy advises the immediate removal of cervical ribs as soon as the diagnosis is made. The early manifestations are somewhat misleading, but if the presence of a cervical rib is suspected the diagnosis will be confirmed by palpation and by the aid of a skiagram. The operation is not difficult or dangerous if the vessels and nerves are displaced; the periosteum should be removed to guard against regeneration of the rib.

Injury of the Thoracic Duct. Injury to the cervical portion of the thoracic duct is one of the dangers on the left side of the neck. This complication was at one time regarded as of a most serious nature and frequently terminated fatally. Our views regarding the gravity of the accident have been modified to a considerable degree by a closer study of the anatomy of the duct. This study has disclosed the fact that a free collateral circulation may become established after injury to the thoracic portion of the duct, and that the cervical portion of the duct terminates in several branches which empty into the innominate vein. In a case described by Brinton the duct divided in the upper portion of

¹ *Annals of Surgery*, March, 1905.

² *Proceedings of the Philadelphia County Medical Society*, June 14, 1905.

the thorax into two branches, which further on united forming a ring. From this ring other branches were given off, one to the subclavian, one to the internal jugular, and the third passed upward and obliquely across the neck. Thus ligation of one of these branches would not have entirely obstructed the lymph flow. Wendell finds collateral branches given off in the upper portion of the duct in fifty per cent. of cases, and smaller anastomoses between it and the azygos vein. The fatal termination of so many cases must be attributed to improper treatment. We will find in the literature upon the subject that in most instances the wound has been tamponed and no attempt made to ligate the injured duct. In only three of the series of sixteen cases treated by tampon was any immediate improvement noticed, and in the remaining the healing process was prolonged and the patient's general health seriously impaired. It is only when the collateral circulation is established that the flow of lymph gradually diminishes and the wound heals by second intention. The treatment should consist therefore in ligation or suture of the duct at the time of the accident, or if impracticable then, as soon after the accident as possible. There is one case on record in which the divided duct was successfully implanted in the internal jugular vein. In each of the 26 cases collected by v. Graff¹ the injury was the result of an operation for the removal of malignant or tuberculous nodes in the cervical region. In the case observed by himself the injured vessel was found and ligated and the patient suffered no ill effects from the accident. Bucknall² reports a case in which the patient regained his strength as soon as the torn duct was sutured, but two months later died of widespread tuberculosis. In the second case the lumen of the duct was obliterated by a malignant growth, and although the wound in the duct was closed with a ligature no serious symptoms developed.

SPREAD OF CANCER BY THE THORACIC DUCT. It has been observed in many instances that carcinomatous processes in the cervical lymph nodes occurs more frequently on the left side, but cases of an apparent primary growth of the thoracic duct have occurred in which the tissues commonly the seat of the primary tumor (tongue, mouth, tonsils, etc.) have been free. From these observations, and from the evidence of an autopsy, Raw³ believes that the spread of malignancy from the abdomen by means of the thoracic duct is more common than generally supposed. The case seen was one of primary carcinoma of the pancreas, with absence of involvement of the abdominal viscera. In the neck, however,

¹ Wiener klin. Woch., 1905, xviii., No. 10.

² British Medical Journal, September 30, 1905.

³ Ibid., June 24, 1905.

all the structures in the triangle were involved, the process originating in the subclavian region, where the termination of the duct was found enlarged, thickened, and carcinomatous.

THE CHEST.

Mammary Gland. DIFFUSE VIRGINAL HYPERTROPHY OF THE BREAST. This condition, though not of frequent occurrence, presents some interesting features for discussion, especially as to its etiology. This question was discussed in a previous number of *PROGRESSIVE MEDICINE*.¹ The process is believed to be a physiological hypertrophy of the elements of the gland, although in some instances the increase in the parenchyma is greater than that of the stroma, and *vice versa*. The symptoms to which this condition gives rise are those which are due solely to the pressure and traction of such tremendous glands. The most distressing symptom and that which most frequently calls for intervention is the interference with respiration. In Warren's case² but one breast was involved. The enlargement was nodular and somewhat tender. Operative intervention was not resorted to because by palliative remedies the enlargement of the gland and the accompanying symptoms subsided. Johnston³ reported a case of four years' duration occurring in a sixteen-year-old girl. The tremendous size of the breast interfered so with respiration that an amputation was necessary.

TUBERCULOSIS OF THE BREAST. The breast may be infected by the tubercle bacilli by five routes: (1) Through the blood or lymph vessels; (2) through the milk ducts; (3) through a skin wound; (4) by contiguity; (5) and from tuberculosis of the ribs or sternum. Functional activity of the gland seems to be a predisposing factor, since the majority of cases reported have been seen in women under thirty-eight years and a few under twenty-one years. While few cases have been diagnosed before operation, in consideration of the history, secondary axillary involvement, and by excluding cysts, mastitis, malignant disease, and gumma, Spencer⁴ recognized the true nature of his case. The mass on examination measured about three fingers in width and four in length, was nodular, hard below and cystic above, with the skin apparently adherent at certain points. The entire breast and lymph nodes were removed, and on microscopic examination the diagnosis was confirmed. Of twenty-seven cases observed by Scott⁵ the tubercle bacilli were dis-

¹ *Progressive Medicine*, March, 1904.

² Surgical Section, American Medical Association, July 11, 1905

³ *Arch. Internat. de Chir.*, vol. ii., Fasc. 2.

⁴ *American Medicine*, March 8, 1905.

⁵ St. Bartholomew's Hosp. Reports, vol. xl., 1905.

covered in but three instances. The sclerotic form was met with in ten cases and in these the diagnosis from scirrhus carcinoma was practically impossible without microscopic examination. With the exception of four patients, all were married and had had children, the lesion was always unilateral, the skin attached in 70 per cent. and the nipple retracted in 30 per cent. of the cases. In order to guard against recurrence and prevent dissemination the entire breast and all the affected lymph nodes should be removed.

SURGICAL PATHOLOGY OF THE BREAST. In a very admirable paper Warren¹ urges the adoption of a more rational classification and a less complicated nomenclature of the lesions of the breast. To accomplish this the surgical and pathological aspects must be brought into a more intimate relationship. He has studied in all 758 cases, one hundred from private and the remaining from hospital practice. The following is a statistical study of the series:

TABLE I.

	M.G.H.	Private cases.	Total.	Per cent.
Carcinoma.....	459	58	517	68
Fibro-epithelial tumors.....	..	..	(86)	(11)
Fibrous type.....	..	..	(70)	(9)
1. Periductal fibroma.....	48	6	54	7
2. Periductal myxoma.....	10	2	12	1.6
3. Periductal sarcoma.....	4	0	0.5	0.5
(2) Epithelial type.				
(Cyst-adenoma).....			(16)	(2)
1. Fibro-cyst adenoma.....	3	1	4	0.5
2. Papillary-cyst-adenoma.....	9	3	12	1.6
Hyperplasia.				
1. Diffuse hypertrophy.....	2	0	2	0.2
2. Abnormal involution.....	87	28	115	15
(Cystic, 59).				
(Proliferative, 56).				
Chronic inflammation.....	..	..	(28)	(1.7)
1. Eczema of nipple.....	2	0	2	0.2
2. Chronic abscess.....	5	0	5	0.6
3. Ductal mastitis.....	3	0	3	0.3
4. Tuberculosis.....	13	0	13	1.7
5. Single retention cyst.....	5	0	5	0.6
Non-indigenous tumors.....	..	..	(9)	(1.2)
Sarcoma.....	4	0	4	0.5
Lipoma.....	3	1	4	0.5
Lymphangioma.....	1	0	1	0.1
Supernumerary breast.....	..	1	1	0.1

¹ Journal of the American Medical Association, July 15, 1905.

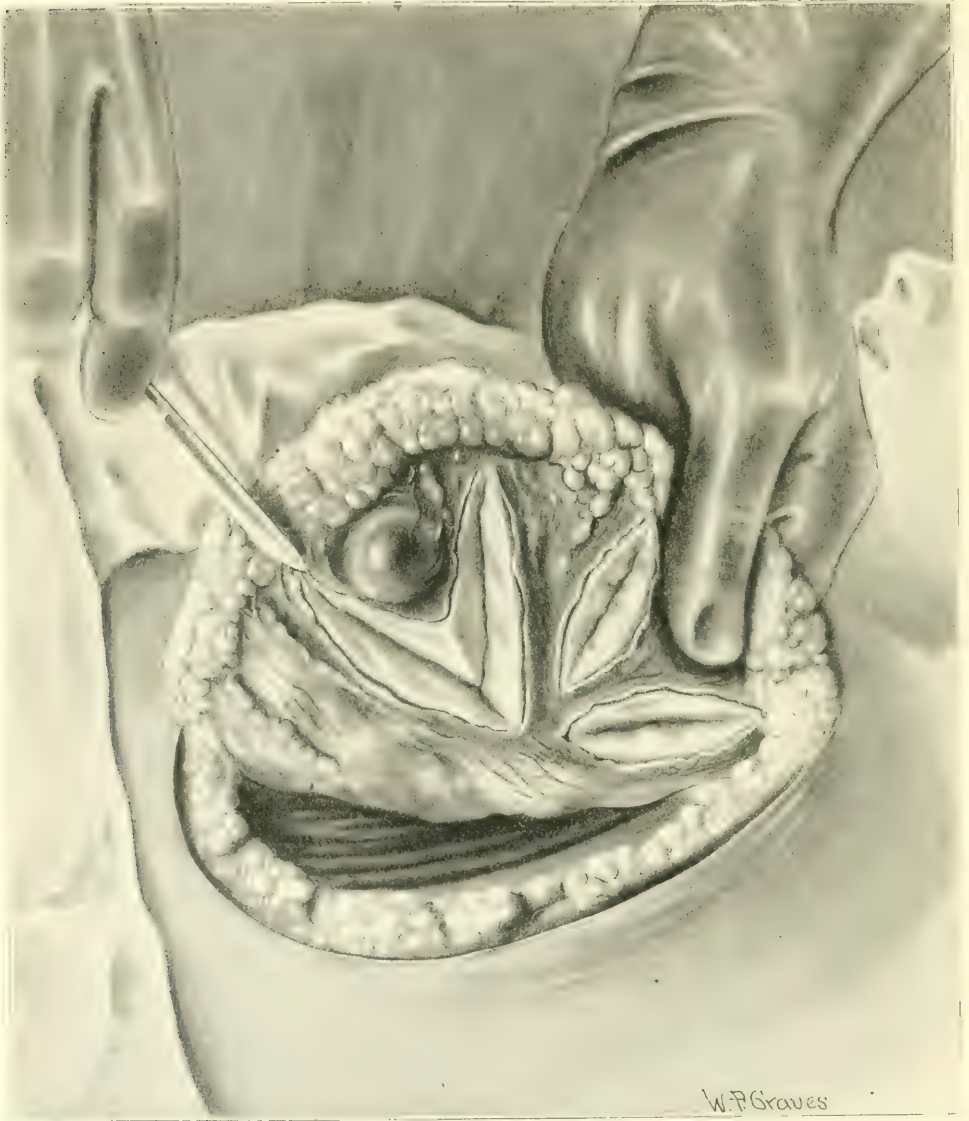
TABLE II. INCIDENCE OF BREAST TUMORS BY AGE DECADES.

	No. of cases.	10-20 years.	20-30 years.	30-40 years.	40-50 years.	50-60 years.	60-70 years.	70-80 years.	80 years.
Carcinoma.....	459	..	6 12%	67 60%	151 70%	30 85%	80 90%	24 100%	1 100%
Periductal sarcoma...	4	..	..	..	1 0.4%	3 2%	..	..	..
Periductal myxoma...	10	..	5 10%	1 1%	3 1.5%	1 .6%	..	..	..
Periductal fibroma...	48	4 45%	26 50%	13 11%	4 2%	1 0.6%	..	..	..
Fibro-cyst-adenoma .	3	..	1 2%	2 2%	..	..	..	..	..
Papillary cyst-adenoma.....	9	..	..	1 1%	3 1.5%	2 1%	3 3%	..	..
Diffuse hypertrophy.	2	1 11%	..	..	1 0.4%	..	..	..	..
Abnormal involution.	87	..	7 13%	20 18%	45 21%	13 8%	2 2%	..	..
Eczema of nipple.....	2	..	..	..	..	2 1%	..	..	..
Chronic abscess and ductal mastitis.....	8	..	2 4%	2 2%	3 1.5%	1 0.6%	..	..	..
Single retention cyst.	5	..	2 4%	1	2 1%	..	..	..	..
Tuberculosis.....	13	3 33%	3 6%	3 3%	4 2%	..	..	..	..
Non-indigenous sarcoma.....	4	..	..	2 2%	1 0.4%	..	1 1%	..	..
Other non-indigenous tumors.....	4	1 11%	1 2%	..	..	1 0.6%	1 1%	..	..
Total cases	658	9	53	112	218	154	87	24	1

Attention is called to the proportion of cancer to other breast tumors and emphasis is laid upon the increased frequency with advancing years. The origin of cancer from benign lesions is illustrated by seventeen cases. The process of involution accompanies or precedes cancer more frequently than any other benign lesion and usually terminates in an adeno-carcinoma. Taking into consideration the origin of the fibro-epithelial growths, the term "periductal fibroma" would seem more appropriate. These tumors vary in size from a bean to a coconut, they occur most frequently in unmarried women, and are situated commonly in the upper outer quadrant. Amputation was necessary only in three instances, because of the size of the tumor and in the other cases the tumor was excised or resected. Of the hyperplastic changes especial attention is given to what he terms the "abnormal involution" in which the glandular tissue atrophies and the

fibrous element becomes hypertrophied. The majority of cases occur between forty and fifty years of age, and usually involve both breasts.

FIG. 6

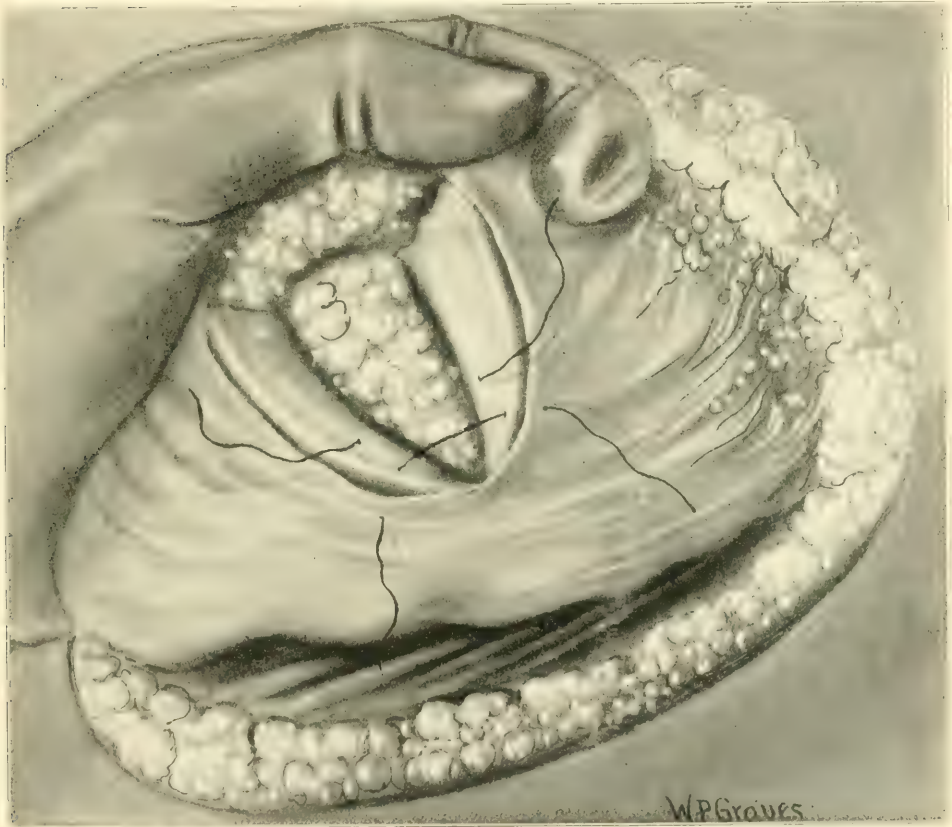


Plastic resection. Removal of wedge-shaped piece containing cysts. Radiating incisions in other lobules. (Warren.)

It is in some cases of this type that Warren applies his method of plastic resection (see Figs. 6 and 7). A long incision is made starting at the

lower border of the breast, running along the lower fold and outer margin to the inner border of the axilla and extending down to the lower border of the pectoralis major. The dissection is carried through the loose connective tissue between the superficial and deep layers of the fascia. The breast can now be inspected by reflecting it upward and inward; if cysts are present they can be removed by a V-shaped incision and if

FIG. 7



Plastic resection. Reconstruction of breast with buried sutures. (Warren.)

necessary secondary incisions may be made radiating from the apex of the V. The V-shaped opening is closed by two rows of sutures, the gland dropped back into place, and sutured to the pectoral muscle at its outer edge. In cases in which there is retraction of the nipple as a result of abnormal involution, the tissue should be so laid open that subcutaneous purse-string suture can be applied in order to force the nipple out. In the sixty-six cases in which he performed this operation

there has been no recurrence, and the results have been so satisfactory that he recommends the operation as a substitute for puncture, which is uncertain, for an exploratory incision which is disfiguring, and for amputation.

OPERATION FOR CARCINOMA OF THE BREAST. Warren¹ describes the operative technique which he employed in one hundred cases. In the first fifty operations, the breast and pectoral fascia alone were removed and the axilla explored. In the remaining cases the complete operation was done; both pectoral muscles were removed, with the exception of the clavicular portion of the pectoralis major, and the posterior cervical triangle explored in numerous instances. The latter measure is omitted when, upon microscopic examination, the upper axillary glands are found to be free from invasion. It is worthy of note that the less radical operation was followed by a larger number of cures; there were fourteen cures in the first series as against twelve in the second. The Halstead operation was performed upon the majority of the cases of the second series, but of late the author has adopted a different technique: An incision is made from the anterior and outer margin of the axilla, running a little above its upper border and the line of insertion of the pectoralis major muscle, around the lower border of the breast to a point on the boundary line of the inner and lower quadrant. The second incision begins at the middle of the anterior axillary fold, gradually diverging from the first as it approaches the breast and sweeping around the upper and inner margin of the organ, meets the first incision in its terminal point. If the cervical region is infected, he makes an additional incision from the middle of the upper half of incision number two, along the posterior margin of the sternomastoid to expose the clavicle and the posterior cervical triangle. This incision is, however, not to be made until a later stage of the operation. The second step of the operation is the dissection of the integument freely on all sides, including the axilla, from the subjacent adipose tissue. When the skin is reflected, a cone with a broad base is exposed, with its apex at the nipple, composed of the breast, pectoral muscle, and fat. The removal of these structures *en masse* constitutes the third stage of the operation. Meyer² begins his operation at the point of insertion of the pectoralis major muscle and works toward the breast, removing the entire muscle. The pectoralis minor is not completely excised, a portion being left at the sternum to fill in the defect left by removing the breast and to afford a more suitable surface for grafting. The functional results have been extremely good and as a rule there has been no œdema.

¹ Annals of Surgery, December, 1904.

² Journal of the American Medical Association, July 29, 1905.

FINAL RESULTS OF OPERATION FOR CANCER OF THE BREAST. The so-called radical operation for carcinoma of the breast, which implies the removal of the breast, pectoralis major muscle, the fat and the lymphatic nodes in the axillary, infraclavicular, and, in certain cases, cervical region, has been performed now for a sufficiently long period of time to enable us to draw some definite conclusions as to the ultimate results. The prognosis after operations for the removal of carcinoma varies very widely, according to the tissue or organ involved; thus, for example, carcinoma of the cervix, carcinoma of the tongue or tonsil, are followed by recurrence in a very much shorter time and in a greater proportion of cases than, for example, carcinoma of the larynx. The reports from various clinics published during the past few years seem to show that we cannot expect more than from 20 to 30 per cent. of permanent cures after a radical operation for carcinoma of the breast. Unfortunately, as Bevan¹ points out, there has been in the last few years a great effort to improve the statistics so far as permanent cure was concerned, and in doing this, there has been a certain amount of juggling. In one well-known surgical clinic (the name is purposely omitted) the report of the surgical removal of carcinoma of the breast had been extremely favorable, but an analysis of the fact offered an explanation for their favorable results; it seems that they had usually divided their cases of carcinoma of the breast into two groups and at the time of operation, or rather after the operation was completed, if, in the judgment of the surgeon, the case was one which gave good prospects of a permanent cure, it was so reported. If the case did not, in the opinion of the surgeon, give a good prospect of a permanent cure it was pigeon-holed in the second group, which was not considered in the final statistics. Such a system is much to be deplored because it disregards the principle of accuracy, so necessary in the record of scientific facts, and it also misleads an easily guided medical public, and creates a false impression as to the actual state of affairs. Until some other and better method of treatment is undertaken the best that we can hope for therefore after the operative treatment of carcinoma of the breast is freedom from recurrence for a period of three years, in two or three out of every ten cases, with the understanding of course that after the expiration of the third year the tumor may recur at any time. It is very generally believed now, I think, that the better results which have been obtained in recent years have been due not so much to the more radical character of the operation as to the time at which the operation is performed. The great majority of cases which we now see are those of comparatively short duration, because physicians generally, and the lay public are now

¹ Medical News, November 18, 1905, p. 1006.

aware of the advantages to be gained by early operation, and the corresponding dangers in delay. Another factor which plays, I believe also a very important part is the more careful histological study to which these tumors are subjected. The tumors of less malignant type such as the adenocarcinoma, or tumors in a transition stage between the simple adenoma and a malignant adenoma, or in the stage of transition from a chronic cystic mastitis to a carcinoma, were in many instances formerly regarded as benign conditions, now by careful histological study their malignant nature is recognized and they are classified in the operative statistics with malignant tumors.

From a study of 247 cases Meissl¹ concludes that a radical operation should be performed as soon as possible, and that the value of individual methods can be estimated only by considering the extent of the process prior to operation. The best results were obtained by means of the operation, devised by Rotter, in which the sternal portion of the pectoralis major and the pectoralis minor were resected with the gland. The percentage of absolute cures during the period from 1890 to 1901 is eighteen. The percentage in Schröder's² series is somewhat higher, for out of 374 cases, 21.1 per cent. were reported cured and in Warren's³ series the percentage is higher still (33 per cent.). The percentage of cures seems to vary according to the nature of the growth. Thus of twenty cases two were "colloid cancer," twelve "scirrhous," three medullary, one Paget's disease, and two adenocarcinoma. Classifying the cases according to the stage of the process, the first includes cases in which the lesion had not changed from the time it was first noticed by the patient; this period is usually of several months' duration. The second is the period in which the growth is more active, this is the period usually when advice is sought, and the period therefore in which the larger number of operations are performed. To the last period belong those cases in which the lesion has involved adjacent structures. The following table is based upon this classification.

Stages.	Cases.	Cures.	Per cent.
1.....	45	19	42
2.....	35	6	17
3.....	18	1	5

The chances of cure are diminished about one-third when the skin is adherent to the tumor; in cases in which the axillary lymph nodes are not infected, 64 per cent. were cured. Thirty of Meyer's patients were operated upon from five to ten years ago, and out of this number seven

¹ Wiener klin. Woch., No. 51, 1904.

² Beiträge zur klin. Chir. xlv., p. 659.

³ Annals of Surgery, October, 1904.

are alive and well to-day, the percentage cured being 23.3 per cent. The ultimate results can only be improved by an earlier resort to operation. It becomes the duty of the physician to advise early operation not only in cases easily diagnosed but also in the doubtful ones.

THE CAUSE OF NECROSIS IN CARCINOMA MAMMÆ. On first thought, it would seem that the occurrence of necrosis in cancer is easily explained. But in reality it is not, for it is a remarkable fact that a tumor which constantly grows, destroying all structures of the body, and producing asthenia, undergoes degeneration itself. Ritter¹ found that necrosis occurs in every carcinoma of the mamma, in the lymph nodes and even in the earliest stages of the tumor formation, and that the degeneration always lies in the centre of the malignant process, the tumor cells merging gradually into the necrotic area. In this transition zone are seen all stages of cellular and nuclear destruction, but there is no reaction zone, except a round-cell infiltration between the carcinomatous ring and the necrotic centre. If the usual explanations for this process are tenable, then we should expect necrosis in the growth of normal tissue, the foetus and finally the teratoma, in all of which such foci of necrosis do not occur. There is no reasonable objection to an attempt to explain this process on the ground that a transitory irritation or injury never causes disturbance of nourishment without reaction. An infarct, for example, always possesses a reaction zone on its periphery. If such an area is not present at the boundary of a carcinoma, and if moreover this necrotic area is not absorbed, but increases in extent, then the process is not of an acute nature, but must be the result of chronic irritation. At present we know of but one mode of injury which will promote such changes, *i. e.* those produced by parasites. Since carcinoma is a chronic disease, it may be compared with affections of like nature as tuberculosis and lues, and the cancerous necrosis agrees in every way from the viewpoint of the pathologist with the caseation of syphilis or tuberculosis. If the analogy between these affections is admitted, we must take an entirely new view of the process in carcinomata. In tuberculosis, the necrotic centre is the place where the tuberculous toxin has acted and the epithelioid or giant cells are the result of the reaction against the poison. Accordingly the "carcinomatous-ring" must be differentiated from the necrotic zone and the carcinoma cells themselves must be regarded as an evidence of the reaction against the organisms. This conception accounts for the unlimited growth of the carcinoma, for we know that proliferation always follows an injury, and if in carcinoma such an injury constantly increases, it is natural to assume that the

¹ Zentralblatt f. Chirurgie, 1905, No. 30.

reaction will increase proportionately and the growth of the tumor will be unlimited.

FORMATION OF LYMPH NODES IN MAMMARY CARCINOMA. Carcinomatous lymph nodes show on section a uniform picture; either the node is more or less completely filled with whitish cancer tissue and the lymph tissue scarcely perceptible, or the latter may be predominant. If one examines carefully an entire chain of extirpated nodes, certain ones will be found to be soft and give the impression of an inflammatory condition. If they are cut, instead of finding lymphatic tissue, a nodule of fat containing but little lymphatic structure is revealed. Microscopically carcinomatous cells, in the majority of these nodes, are absent. Ritter¹ concludes that they are the result of a transformation of a fat nodule into lymphatic tissue. Bayer first proved that after removal or disease of the lymph nodes, new ones could develop. He attributed this proliferation to a mechanical irritation caused by lymphatic stasis in the collaterals and proved that the fat tissue underwent a transition and became adenoid. On the ground that lymphatic tissue proliferates after infection, Ritter assumes that the new nodes in carcinoma are not structures proliferated through inflammation, but are the first evidences of the bodily reaction against the malignant invasion. That the lymphatic proliferation has nothing to do with ulceration of the primary malignant focus is very evident from the fact that in some cases there is no ulceration.

OOPHORECTOMY FOR INOPERABLE CARCINOMA OF THE BREAST. In an analysis of ninety-nine cases treated by this method, H. Lett,² found that a considerable improvement was observed in 23.2 per cent., a less marked one in 13.1 per cent., and in 43.3 per cent. of all cases under fifty years of age the result was favorable. The improvement consisted in the alleviation of pain, diminution or even disappearance of the tumor, healing of the ulceration and prolongation of life. One case could be said to have been cured, improvement persisted in fifteen cases for a period of one year, while five enjoyed good health for a period of four and one-half years and longer. Amputation of the breast after removal of the ovaries should be postponed until the tumor has contracted to the smallest extent likely; the most favorable age for the breast operation is between fifty and fifty-five. The menopause affords no contraindication, but secondary carcinoma does; a rapid growth or recurrence of the tumor gives an unfavorable prognosis. The operative mortality was 6 per cent. Histologically the retrogressive changes in one tumor were those of atrophy and fibrous transition of the cellular elements. Up

¹ Deutsche Zeitschrift f. Chirurgie, Band lxxix., Heft 1-3.

² Lancet, January 28, 1905.

to the present time, the explanation of this peculiar relationship has been purely conjectural.

X-RAY TREATMENT IN MAMMARY CARCINOMA. While the curative effect of the x -rays upon superficial lesions of malignant disease is acknowledged, their efficacy in deep-seated infections is a subject of much controversy. While a few cases have been reported in which cure has been claimed, yet in the majority of cases the most that can be hoped for in deep-seated tumors is an inhibition of the growth. Many surgeons advise the use of the rays in conjunction with operation, the application to begin as soon as the wound has healed, on the ground that any carcinomatous masses not recognized at the operation may be destroyed. Soiland¹ after extirpating the breast and glands applies the x -rays, believing the ultimate results, as far as function and recurrence are concerned, to be better than when the pectoral muscles are removed. In cases in which operation is impracticable or has been refused, or in cases of recurrence after operation, the x -rays offer some hope, at least, of alleviating the pain. As a rule the pain will disappear after a few sittings and a gradual reduction in the size of the tumor and nodes may follow. Generally the nodes respond more readily than the tumor mass, and this is considered by Soiland a significant prognostic fact. Primary carcinoma has been reported cured by Schiff,² Wohlge-mutt,³ Soiland,⁴ and Pusey,⁵ although in some of these cases the time elapsing has not been sufficiently long to warrant their claims. In Schiff's case of an inoperable cancer *en cuirasse*, four months after beginning the treatment, the tumor had been replaced by a flat scar, crossed by some enlarged capillary vessels; the cutaneous metastasis had disappeared and all the lymph nodes had become soft and diminished in size. One nodule upon microscopic examination was found to be composed of fibrous tissue resembling a cicatrix; between the fibres leukocytes were seen, and the deeper parts of the nodule contained thin bundles of carcinoma cells separated by a stroma of fibres. It is in the secondary or recurrent tumors that the greatest hope of x -ray treatment may be expected. Pusey has treated eighteen cases in which further surgical aid was out of the question, and in 50 per cent. of these there was at least considerable relief from the pain and other distressing symptoms.

CARCINOMA OF THE MALE BREAST. The patient, a man of thirty-three, first noticed a hard swelling of the right breast, probably the result

¹ Southern California Practitioner, July, 1904.

² Bulletin of the Johns Hopkins Hospital, July, 1904.

³ Roentgen Congress, April, 1905.

⁴ Loc. cit.

⁵ Journal of the American Medical Association, May 13, 1905.

of pressure from his occupation. The tumor formation increased until it was removed by an elliptical excision of the breast by Tousey.¹ The axillary lymph nodes were not removed as they were not involved. Macroscopically the tumor closely resembled a fibroma, but on microscopic examination its carcinomatous nature was revealed. Six months later a tumor appeared in the other breast; it was not so hard as the one removed or so adherent, but decidedly more painful. The Roentgen rays were applied and at the end of seven weeks the tumor began to diminish and by the eleventh week had disappeared. Although the treatment has been discontinued more than a year there has been no recurrence. It is in the less malignant type of cases, such as this one, that the x-rays are most effective.

PAGET'S DISEASE OF THE NIPPLE. The characteristic microscopic changes occurring in this affection may be described first as an evident if not high-grade hyperplasia of the cells in the epidermis. Some cells swell and become rounded and lose their fibrils and intercellular processes, the nuclei become large and rich in chromatin, and in numerous cells mitotic figures are seen. Because these cells increase through division, larger or smaller alveoli arise in the epidermal layer, and where these changes are most marked, there is a certain similarity to carcinoma. The tissue between the proliferating epithelial cells is not formed from connective tissue, but Krogus² believes it to be composed of strings of compressed epidermal cells. The altered cells have developed from differentiated cells of the epidermis into more indifferent epithelial cells which are unable to fill the physiological property of the skin, but have the power of increasing without limitation. In other words, the cells have undergone an anaplasia and have assumed the character of tumor cells. The author therefore does not hesitate to compare the proliferative changes of Paget's disease with those in which the proliferation penetrates the connective tissue and produces a true carcinoma. When secondary carcinoma develops in a breast already affected with Paget's disease, the proliferative process extends downward through the sweat or milk ducts, it distends the duct, and finally breaks through. The manner in which the process extends from the epidermis to the gland ducts is not known; it is possible that the same agent which caused the epidermal anaplasia may at a later stage provoke a similar change of the ducts.

The Œsophagus. ŒSOPHAGOSCOPY. The advance which has been made in this field of surgery during the last few years is evinced by the large number and variety of cases reported. The compilations of Starck³

¹ Medical Record, 1905, p 181.

² Deutsche Zeitschrift f. Chirurgie, Band lxxiii., Heft 3.

³ Münchener med. Wochenschrift, February 28, 1905.

and Reizenstein show results of a most gratifying nature; the former has collected 59 cases of foreign body in the œsophagus in which the œsophagoscope was used successfully fifty-five times in their extraction. The foreign bodies removed have been coins, false teeth, pieces of meat, pins, etc., the exact location of which can often only be determined by the œsophagoscope. Early inspection of the œsophagus is urged in all cases, otherwise the œsophageal mucosa becomes ulcerated and the removal of the foreign body made more difficult. Extraction through the tube has proven such a satisfactory procedure that the method of pushing the object into the stomach should, as a rule, be condemned. In the event of a failure one must resort to either œsophagotomy or gastrotomy.

The technique of œsophagoscopy has been improved by the use of "hydrodilators." Glucksmann's¹ instrument, which has proven highly efficient in his hands, consists of a short, narrow cylinder and optic tube. After its introduction water is forced into the rubber bag placed at the proximal end of the cylinder and this distention of the bag pushes the walls of the œsophagus back and prevents the cylinder from coming in contact with them. The distal third of the cylinder is composed of a metal sheath, in each half of which there is an electric light and reflector. The separation of the walls is also of advantage during the extraction of a foreign body, as it prevents laceration of the mucous membrane.

Glucksmann² further calls attention to the complications which at times follows the presence of foreign bodies—*e. g.*, mediastinitis and pyemia. As these accidents are attributed by the patient's friends to the instrumental manipulation the probability of their occurrence should be explained. The sensations of the patient may be of assistance in locating the foreign body; if on being asked its location the patient places his finger in the mouth, it can be assumed that the object is above the pharyngeal constrictors, while it is found lower down when some spot on the neck is indicated.

Distention of the Œsophagus for Removal of a Foreign Body. The above means was adopted by Franck³ on board ship. The patient's age and arteriosclerosis prevented the continued use of the stomach tube to push the foreign body, a piece of tough meat, into the stomach. As his condition grew worse and mechanical means of aid were refused, distention by gas was attempted. Accordingly two halves of a Seidlitz powder were given separately and the patient instructed to hold the mouth and nostrils shut in order to prevent the escape of gas. In a few

¹ Berliner klin. Wochenschrift, Bd. xli., No. 22.

² Deutsche med. Wochenschrift, June 5, 1905

³ Münchener med. Wochenschrift, February 28, 1905.

minutes relief was experienced and the foreign body displaced, probably by the distention of the œsophagus and the pneumatic pressure.

ŒSOPHAGOSTOMY FOR FOREIGN BODY. This operation is indicated in cases in which the œsophagoscope fails to remove the foreign body, or if because of its size and the condition of the œsophageal walls the body cannot be pushed into the stomach. Balacesco and Cohn¹ have collected 320 cases from the literature since 1738; during the last three years 55 operations were performed with a mortality of 12.6 per cent. The mortality varies considerably with the nature of the foreign body, 11.1, 27.8, and 33.3 per cent. mortality being caused respectively by coins, bones, and stones. Death is almost always due to the changes incited by the presence of the foreign body, such as ulceration, perforation with abscess formation, and hemorrhage. External œsophagotomy is performed when the foreign body is in the cervical or in the upper part of the thoracic portion of the œsophagus, but if 32 cm. or more from the front teeth Baratynski² advises gastrotomy. For ordinary cases, and especially in emergency work, œsophagotomy has proven the most certain and the least dangerous method. Kramer³ has been able to dislodge a plate of false teeth by manual manipulation through a cervical wound which merely exposed the œsophagus. The patient's retching brought the plate into the throat in one case, and in the second, as there was no retching, the plate was extracted with forceps after dislodgement.

The symptoms of a foreign body in the œsophagus may not arise for weeks or even months after its impaction. Fulletin⁴ reports a case in which a coin was impacted twenty-five weeks before ulceration of the œsophagus began. Suture of the œsophagus was followed in Balacesco and Cohn's statistics by a mortality of $14\frac{1}{4}$ per cent., while in those cases not sutured the mortality was $23\frac{6}{10}$ per cent.

CONGENITAL OCCLUSION OF THE ŒSOPHAGUS. In the majority of cases of congenital occlusion the upper portion of the œsophagus is dilated into a sac which terminates at different distances from the mouth in a rounded form. In those cases in which the œsophagus was open for the greatest extent the termination was found one-half inch above the tracheal bifurcation. In several of the 19 cases collected by Thomas⁵ other developmental defects were present. Gastrostomy offers the brightest prospects; the opening should be large and at once united firmly to the skin so that feeding can be commenced without delay.

¹ *Revue de Chirurgie*, vol. xxv., No. 2.

² *Rousky Vrach*, March 20, 1904.

³ *Centralblatt f. Chirurgie*, Bd. xxxi., No. 50.

⁴ *British Medical Journal*, May 7, 1905, p. 1074.

⁵ *Lancet*, February 6, 1904.

In view of the fact that in some cases the œsophagus opens into the trachea just below the larynx, Thomas suggests a tracheotomy with the introduction of food into the stomach by this route. The tracheotomy tube would prevent food from entering the trachea, and nourishment could be passed into the œsophagus above the tube. Only one of the cases was operated upon, the child lived fourteen days, the longest time on record.

CICATRICAL STENOSIS OF THE ŒSOPHAGUS. The use of the œsophagoscope in the extraction of foreign bodies has been spoken of; no less important is its application in the treatment of other conditions of the œsophagus. The following rules have been formulated by H. Reitzenstein¹ for its use in cicatricial stenosis: When a cicatricial stenosis will not admit a sound by the usual methods before operative measures are performed the œsophagoscope should be used. If success is met with the stenosis should be further dilated by means of a laminaria tent, rubber or flexible metal sounds. If this attempt does not succeed, a gastrotomy must be performed and the stricture dilated by retrograde sounding through the œsophagoscope, which is introduced in the gastric fistula.

If the patient's condition is such that nourishment is urgent a gastrostomy should be done without delay. If after gastrostomy it is not possible to pass a silver ball, to which a string is attached, through the stenosis, an external œsophagotomy or a combined œsophagotomy with the use of the œsophagoscope is the next measure. In the author's first case complete dilatation was possible through the œsophagoscope; in the second gastrostomy with retrograde œsophagoscopy was undertaken, and the stenosis, which was 3 cm. above the cardia, was dilated.

J. E. Thompson² has collected 9 cases of typhoid stricture of the œsophagus, and reports 3 observed personally. Permanent relief followed after dilatation in 2 cases, but in the third the relief was only temporary. The exact nature of typhoidal ulceration in the œsophagus is not thoroughly understood, although Louis considered it a complication caused by the extreme malnutrition of the tissues. Ulcers found at the lower end of the œsophagus are probably the result of peptic digestion, and those in the upper portions are of typhoidal origin.

ANASTOMOSIS OF THE ŒSOPHAGUS. The negative pressure chamber of Sauerbruch³ has made possible certain operations on the œsophagus; according to Sauerbruch three points in œsophageal surgery should be particularly considered, viz.: 1. Perfect asepsis. 2. Employment of

¹ Münchener med. Wochenschrift, 1905, No. 19.

² Annals of Surgery, May, 1904.

³ Zentralblatt f. Chirurgie, January 28, 1905.

substances to produce adhesions between the serous coats. 3. Substitution of the Murphy button for the suture. The negative pressure of 10 to 12 mm. of mercury in the cabinet excludes the possibility of pneumothorax, the operation being done within the cabinet, the patient's head being outside.

The anastomosis between the stomach and œsophagus is effected as follows: the left pleural cavity is opened in the fifth intercostal space, the pleura caught and incised the length of the superficial wound. The lung is displaced by tampons until the aorta and œsophagus are exposed, the œsophagus is then seized above the diaphragm and drawn up until the abdominal portion comes into view. The pleura and peritoneum overlying this portion are incised, and through the opening in the peritoneal cavity the stomach is drawn. The vagi must not be injured and the œsophageal attachments must not be disturbed. The female portion of the Murphy button attached to an œsophageal sound is passed into the stomach by an assistant from without the pneumatic chamber. The operator seizes this half of the button, passes it into the fundus of the stomach, and then makes a small incision at the point at which the anastomosis is to be effected. The male portion of the button is introduced in a similar way, fixed in a suitable place in the anterior wall of the œsophagus, and the button closed. The diaphragm and stomach are sutured in such a way as to ensure a sufficient portion of the stomach being in the pleural cavity to prevent tension on the diaphragm. Then the anastomosis, the diaphragmatic suture, and the pleura are painted with Lugol's solution, the pleural cavity washed with normal salt solution, and the intercostal incision united by three layers of sutures.

The greatest danger has been a hernia of the stomach into the pleural sac as a result of imperfect gastroduaphragmatic suturing; the resulting cardiac compression caused instant death in three of thirteen dogs operated on. Resection of the œsophagus is identical with the above operation in its preliminary steps. The vagi are separated, the œsophagus clamped below the button, ligated, and resected. The lower stump is invaginated into the stomach, the upper stump is covered by the fundus of the stomach to which it is sutured. The final steps are the same as in the anastomosis operation. Dewitt Stetten¹ believes that "although the application of Sauerbruch's experiments may be limited, yet the practicability of surgical work upon the œsophagus has become an established fact. When one considers that the cabinet has been used but a short time, it is easily conceived what possibilities have been opened by this system, not only in regard to œsophageal work, but also in the domain of the surgery of the lung itself, the pleura, ribs, mediastinum, and diaphragm."

¹ New York and Philadelphia Medical Journal, June 10, 1905.

EXCISION OF THE CERVICAL PORTION OF THE ŒSOPHAGUS. In a case upon which Terry¹ performed a laryngectomy for carcinoma a recurrence of the growth involving the œsophagus took place. The extirpation of the mass including the œsophagus was then determined upon. Two lateral incisions were made, extending from the angles of the jaw to within an inch of the clavicle and about three and a half inches apart, and two cross-incisions above and below connecting these. Through these incisions the submaxillary glands, the remains of the epiglottis, the hyoid bone, the anterior three-fourths of the œsophagus, and the thyroid gland were dissected out *en masse*. As only the anterior portion of the œsophagus was involved, about one-quarter was left posteriorly, with the expectation of creating a mucous surface to cover the cervical vertebrae. The edges of the defect were united on either side partly to the strip of œsophagus and partly to the carotid sheaths. The muscles which had been attached to the hyoid bone were drawn together and the mucous membrane at the base of the tongue was attached to the skin margin beneath the lower jaw. The pharynx was packed but not sutured, because of the possibility of injuring the strip of œsophageal mucous membrane. Convalescence was rapid and uninterrupted.

Subsequently the patient regained his weight and was able to masticate his food and swallow it by means of a simple funnel-shaped rubber tube which was suspended above to the opening of the pharynx and introduced an inch or two into the œsophagus. The feasibility of forming a new anterior wall for the cervical œsophagus by means of skin flaps was rejected by Terry because the flaps would have to be taken from some other part of the neck, and, moreover, would mask the early signs of a recurrence.

DIVERTICULA OF THE ŒSOPHAGUS. The general supposition that diverticula of the œsophagus are rare is probably erroneous, and many patients undoubtedly go through life without realizing the presence of such a lesion. The diagnosis of this condition is usually easy, and may be based upon the history, subjective symptoms, and exploration; the *x*-ray and œsophagoscope should clear up any doubtful case.

The treatment may be either radical or palliative. The latter consists of the persistent use of the sound and the stomach tube to keep the pouch empty and clean. Astringent or antiseptic solutions may be applied to relieve inflammation or ulceration in the sac. When the dysphagia is extreme and the œsophagus permeable to a stomach tube, lavage is indicated. Gastrostomy should be reserved for those cases in which the palliative measures fail to relieve the patient or when more radical measures are impossible.

¹ Journal of the American Medical Association, September 30, 1905.

Of late numerous incisions of œsophageal pouches have been reported, and among others the case of Barrow and Cummings¹ is of interest. After an œsophageal bougie was passed into the pouch an incision four and a half inches long was made along the anterior border of the sternomastoid beginning at the sternoclavicular joint, the sternomastoid was pulled outward, the sternohyoid and sternothyroid inward, exposing the carotid sheath. The vessels were then retracted outward and the trachea inward, disclosing the œsophagus, behind which was seen a white fibrous-coated pouch one and a half inches long. The neck of the pouch was in the lowest part of the posterior wall of the pharynx. The fibrous coat was divided around the neck of the pouch and turned back as a cuff, the mucous membrane ligatured, cut through, and the fibrous coat stitched over it. The muscular coat was then brought together over the site of the neck of the pouch. Drainage was introduced but removed in three days, as there was no discharge from the wound. The patient was fed by enemata for seven days and made an uneventful recovery. Of 27 cases collected by Lotheissen 5 died. Walter Wood² suggests a preliminary gastrostomy in emaciated patients, to be followed if desired by the removal of the pouch after an interval of some months.

TRACTION DIVERTICULUM. After an investigation into twelve œsophageal diverticula H. Ribbert³ states anew his belief that traction diverticula are not caused by lymph nodes whose previous inflammation have caused adhesions to the œsophagus with secondary contraction. He attributes it rather to a congenital anomaly in the œsophageal wall, and to the presence of connective tissue between the wall and the bifurcation of the trachea. This error in development arises at the time of the separation of the trachea from the œsophagus, so that a more or less extensive union between the œsophagus and trachea remains by means of a connective-tissue band. At the place where this band is attached to the œsophagus there is an abnormal arrangement of the muscle layers of the œsophageal wall. As a result spaces are formed which, because of the regularity of the connective tissue, cannot be regarded as secondary to inflammatory contraction, but must be looked upon as of primary origin. By a dislocation of the œsophagus these abnormally placed connective-tissue bands are put on the stretch, and since the wall is weaker at their point of insertion an ectasia easily follows. Cicatricial contractures may play a part, but only as contributory factors.

¹ *Lancet*, April 8, 1905.

² *Brooklyn Medical Journal*, May, 1905.

³ *Virchow's Archiv*, Bd. clxxviii. p. 351.

CARDIOSPASTIC DILATATION OF THE ŒSOPHAGUS.¹ It is doubtful if these spasms are altogether of nervous origin, and many believe that they are the result of small anatomical lesions, such as ulcers or fissures. Certainly at the necropsy the dilatation is often found without any anatomical stenosis to account for it; had there been a spasm *intra vitam* it disappeared *postmortem*. Forceful dilatation should not be undertaken until all symptoms of inflammation in the œsophagus disappear, and the instruments used for the purpose must be soft and flexible to prevent injury of the mucosa. A soft-rubber tube with a hollow metal guide terminating 2 cm. from the end of the tube is introduced and gently inflated as the tube is advanced. After this method has been systematically used for a time a spindle-shaped bag on a stomach tube is substituted and the œsophagus dilated. When the collapsed bag is in the stomach it is inflated to a circumference of 9.5 cm., the amount of air necessary having previously been determined. Gentle traction on the stomach tube causes the dilatation of the spasm by bringing the bag through the cardia, the air is then allowed to escape and the tube withdrawn. Relief soon follows after such measures are practised, the patients gain in strength and weight, although the capacity of the œsophagus is not altered to any extent.

The Bronchi. BRONCHOSCOPY. The term upper bronchoscopy has been applied to the introduction of the bronchoscope through the mouth and larynx, and lower bronchoscopy to its introduction through a tracheotomy wound. Upper bronchoscopy is the more difficult because of the trouble in passing the tube through the glottis, the greater length of tube to be illuminated, and because of the difficulty in turning the instrument into the bronchus from the trachea. Lower bronchoscopy, according to Killian,² should be performed only when severe dyspnoea or a marked pulmonary complication is present, when the patient is weak, or the foreign body to be extracted is of such an irregular shape that injury to the larynx may result during its removal, and, finally, when the foreign body has become swollen or softened. Two-thirds to three-fourths of all cases can be treated by the upper route.

General narcosis with the head hanging backward is advised by Killian, together with local anæsthetization of the larynx by a 20 per cent. solution of cocaine, and some surgeons administer a full dose of atropine before the operation in order to lessen the amount of pulmonary secretion. As much difficulty is experienced in introducing the bronchoscope into the larynx, Ingals³ has devised a method which greatly

¹ Berliner klin. Wochenschrift, Bd. xli., No. 49.

² Arch. f. klin. Chirurgie, Bd. lxxvii., Heft 2.

³ New York and Philadelphia Medical Journal, July 8, 1905.

simplifies the operation. He first introduces an obturator, fashioned like an intubation tube, over which a spiral steel tube fits, and when the end has passed the glottis the obturator is withdrawn. The patient's head is now bent far backward and a steel guide passed through the spiral tube; the tube is withdrawn and the bronchoscope slipped easily over the guide into the trachea. After the end of the bronchoscope has passed a few inches below the larynx it should be advanced cautiously down the trachea until the bifurcation is found, the patient's head turned to the opposite side, and the instrument pushed into the bronchus of the affected lung. When there is much secretion or pus valuable time is consumed in swabbing out the bronchi; to obviate this difficulty Ingals uses a small aspirating pump. This is connected with an aspirating tube whose diameter is only 2 mm. and does not interfere with the illumination; it also does away with the irritating effect of swabbing, and can be used as a probe in searching for foreign bodies. Since the introduction of the bronchoscope by Killian 87 cases of foreign body in the lung treated by his method have been reported. He concludes that nine-tenths of such cases can be successfully treated by bronchoscopy. When the foreign body is small and lies deeply in the lung, or when the stenosis is so great as to prove an insuperable obstacle, a pneumotomy may be considered. Although Killian considers the operation perfectly safe, yet some cases have been reported with a fatal result. One may fail to find the foreign body when it is lodged in an abscess cavity, or, as in the case of a small body, it may be impossible to introduce the bronchoscope into the small bronchial tube, whose walls collapse and conceal the body. The use of the bronchoscope is not limited to the mere extraction of foreign bodies, but to localizing objects which require removal through the chest wall; in these cases the instrument acts as a guide and directs the operator to the affected spot.

Suppurating foci in the lung, providing they communicate with a fair-sized bronchus, may be located, their contents aspirated, and medicaments insufflated.

Ingals¹ believes a study of the direct action of drugs may be made through the bronchoscope and as a result of such study a more intelligent and effective therapeusis in certain affections of the heart and lungs prescribed. Dixon and Brodie, who have made important investigations in this field, classify certain drugs as bronchoconstrictors and bronchodilators. They conclude that inhalation of ether or chloroform for anæsthetic purposes abolishes the effect of the vagus on the bronchioles; this action is due to paralysis of the nerve endings by direct absorption through the mucous membrane. Reflex bronchial constriction is best

¹ Journal of the American Medical Association, October 28, 1905.

obtained by exciting the nasal mucous membrane; muscarine, pilocarpine, and physostigmine excite the endings of the vagi and induce constriction of the bronchi. This effect may be counteracted by atropine; while veratrine, bromine, and salts of many of the heavy metals produce a constriction, which is not influenced by atropine. These results should be useful in treating certain cases in which expectoration is difficult. Chloroform, ether, lobelia, and atropine induce dilatation of the bronchioles when constriction is present, lobelia producing a transitory, and atropine a permanent dilatation.

The Lung. ACTINOMYCOSIS OF THE LUNG. Ingalls¹ describes actinomycosis as a chronic inflammation characterized by the production of areas of necrosis, connected by fistulæ with each other, with internal organs or leading to the external surface. The disease has a tendency to extend in many directions, involving those structures with which it is in immediate relation, and in the lung it is frequently followed by fibrous induration and later perhaps by immobility of the chest. In the pleuropneumonic form the infection comes from without, the pleural surfaces undergo thickening, the lung becoming pneumonic and permeated by necrotic tracks which may rupture into bronchi giving the bronchopneumonic form of actinomycosis. The pleuritic adhesions form pockets, which soon become converted into pus sacs, and burrowing takes place in the direction of least resistance. The organisms reach the lung usually through inhalation of infected particles, although the process may be caused by extension from a neighboring focus of infection. Sometimes the affection arises as the result of metastasis through the bloodvessels. This was so in the case reported by Ingalls, whose patient presented a tumor 8 cm. in diameter in the right interscapular space protruding about 2 cm. and having at its centre a fluctuating area. The abscess which was evacuated was found to contain yellowish granules and typical ray fungi. Drainage was introduced and the cavity healed by granulation. This was a case of the pleuropneumonic form, which because of its limitation and because of the absence of symptoms or signs pointing to involvement of the pulmonary parenchyma, was probably secondary to a skin infection. The prognosis is always grave but the sooner the diagnosis is made the better are the prospects of recovery. Recurrences have been observed when the process had apparently undergone resolution. If metastatic lesions have developed in the other organs, the outlook is hopeless. In addition to surrounding the patient with proper hygienic conditions, the treatment consists in the administration of potassium iodide in large doses, a very effective remedy in early cases without secondary infection. Apart

¹ Medical Record, July 1, 1905.

from the evacuation of abscesses and possibly some of the infected tissue, there is nothing to be accomplished by surgical intervention. In some cases the x-ray has served to prevent extension of the growth and to stimulate resolution.

LUNG ABSCESS. Surgical treatment has been more successful in the treatment of pulmonary abscesses following pneumonia than those of other origin, as abscesses due to a foreign body or tuberculosis. In the pneumonic form the pus collections are usually single, while in tuberculosis, multiple abscesses are more common. The symptoms may be insidious, and the affection not recognized until pus is discharged through a bronchus. The localization of an abscess presents more difficulties than does an empyema, for the exploratory needle cannot be used for fear of infection of the healthy pleura unless there be adhesions between the pleural layers. Some information may be derived from a skiagraph. After one or two ribs are resected over the affected area, the surgeon should introduce a trocar, and if pus is encountered a free opening should be made with knife or forceps. Cumston² rather deplores the use of exploratory needles; it is not only dangerous but often unsuccessful. He prefers direct exploration. The Paquelin cautery is not as essential as once it was supposed to be, for it has been demonstrated that there is little danger of serious hemorrhage. Hemorrhage may be avoided in deep-seated lesions by using the fingers to make a passage through the lung tissue. If no adhesions exist between the lung and the chest wall and the abscess has been found, it may be drained immediately, or after adhesions have formed. If the patient's condition is favorable Gibbon² advises waiting for twenty-four or forty-eight hours, that is until the adhesions have formed. Adhesions may be excited by packing or by suturing the lung to the chest. If tubes are used for drainage they should not be left in one place for any length of time, as ulceration and hemorrhage may result from pressure.

PLEUROTOMY FOR PULMONARY HEMORRHAGE. The conservative treatment of pulmonary hemorrhage consists in absolute quiet, occlusion of the wound, and compression of the thorax; the majority of cases recover with this expectant plan of treatment, and operation is rarely resorted to. In certain instances the symptoms do not respond however, the hemorrhage is not controlled by clotting, and the pleural cavity becomes filled with blood. According to Cumston³ operation should be performed when there is an extensive area of dulness involving almost one-half of the thorax, with the presence of ægophony and the absence of fremitus over the same area. As a rule early operation is

¹ Proceedings of Philadelphia County Medical Society, August, 1905.

² St. Paul Medical Magazine, November, 1905.

³ St. Paul Medical Journal, November, 1905.

indicated because in the majority of cases hemothorax is fatal in the first few days. Puncture is not effective because it merely relieves the dyspnoea, but does not control hemorrhage; it is furthermore dangerous in that the relief of pulmonary pressure may increase the bleeding. After resecting one or two ribs, the pleura is freely opened, the cavity emptied of blood, and the lung examined for the seat of hemorrhage. Hemorrhage is controlled by ligation if possible, or by tampon, and drainage of the pleural cavity must be provided for. When the incision is high, the wound may be closed and drainage re-established according to Delagenieri's method, by resecting a portion of the ninth rib. Goire¹ recommends sutures of fine silk for wounds of the parenchyma and tampons to control hemorrhage from large arteries; he has observed immediate inflation of collapsed lungs and cessation of hemorrhage after suturing. The sutures should not go too deep, and should be loosely tied in order not to compress the lung tissue. The suture material does not give rise to any reaction in lung tissue.

PNEUMOTOMY FOR BRONCHIAL DILATATION. Putnam² has used this method for the treatment of bronchiectatic cavities with a profuse malodorous discharge. After the cavities were located by a needle, which served as a guide, they were opened with a Pacquelin cautery. After an unsuccessful operation, in which the cavity was drained, Tuffier³ recommends thoracoplasty to cause pulmonary retraction and obliteration of the bronchial dilatation.

Operations on the Posterior Mediastinum. Very little has been heard, at least in this country, of the *pneumatic chamber* which was first described and used two years ago by Sauerbruch. In the March, 1903, issue of *PROGRESSIVE MEDICINE* the pneumatic chamber was described in detail. The results of Sauerbruch's test of the apparatus were fully discussed, and it seemed to me at that time that at last a solution had been offered to the problems confronting the surgeon in operations upon the thorax. Although there are a great number of technical difficulties, the real danger in these operations is the unavoidable acute pneumothorax; this pneumatic chamber was designed to prevent this complication, and although it was cumbersome and expensive it seemed to answer the purpose for which it was constructed. Operations upon the mediastinum, particularly the posterior mediastinum, are perhaps the most difficult of any we are called upon to perform, and should be undertaken only when other means of treatment have failed, and when life is threatened. The most common indications for operation are said to

¹ Arch. klin. Chir., Band lxxvii., Heft 1.

² Courier de Medicine, August, 1905.

³ Gaz. des Hôpitaux, July 4, 1905.

be the presence of foreign bodies in the œsophagus, which cannot be extracted in the usual way, carcinoma of the œsophagus and suppurative mediastinitis. The older methods of reaching the posterior mediastinum have been unsatisfactory because of inadequate exposure. Faure¹ shows how important it is to resect the first rib as well as the others. He found that when the first rib was excised that the shoulder could be pushed aside and a very much better exposure of the mediastinum obtained. In two cases in which he employed this method he was able to examine the trachea and bronchi, and have adequate room for the manipulations that might be required in any operation in this region.

DERMOID CYSTS OF THE MEDIASTINUM. It is generally considered that these tumors owe their origin to misplacement of fetal structures, either by the invagination of glandular tissue or by the closure of fetal clefts. Morris² in his analysis of 57 cases found they affected both sexes equally, but that the largest number occurred in the third decade of life. The tumor varied in size from that of a walnut to that of a child's head, and was usually situated in the anterior mediastinum. In the course of its growth the tumor may invade the lung, the pleural sac, or even extend up into the neck. There are almost always adhesions binding the tumor so firmly as to make extirpation both difficult and dangerous. During the early stage of life dermoid cysts are usually latent, but about the age of puberty they become more active and grow more rapidly. This sudden change in the course of the disease has been attributed to injury or pressure, and in Morris' case the lesion was attributed to a blow over the heart. Dyspnoea is one of the earliest symptoms and later is associated with pains in the chest, pleural effusion, cough, hæmoptysis, asthma, pneumonia, and abscess.

The symptom complex of this affection is as varied as its mode of onset is atypical. As the disease advances the symptoms become aggravated, and are then associated with other evidences of intrathoracic disease. The expectoration is frequently foul; at first small in amount it later becomes very abundant. The sputum arises from the bronchial mucosa or from the cyst; if from the latter the diagnosis may be made by microscopic examination, the presence of squamous epithelial cells, fat drops and cholesterin being suggestive of, and the occurrence of, hair pathognomonic of dermoid cysts. Hair, however, even when present in the cyst is not always expectorated, for it may become rolled up in masses which are too large to pass through the bronchi should the cyst rupture. According to their course Dungschat has grouped the cases in three classes. In the majority of cases it begins

¹ John Hopkins Hospital Bulletin, April, 1905.

² Medical News, August 26, 1905.

with an insidious onset, and the symptoms gradually increase in severity; in a few cases with a similar onset the progress is rapid; and in others the onset may be sudden and the symptoms irregular both as to their severity and appearance. The disease is essentially chronic and the expectation of life is one or more years; such intercurrent infections, as pneumonia, tuberculosis and malignant changes are rather common. Without operation the condition is hopelessly fatal; the operative mortality is about 30 per cent. In Morris' series, operation was performed on twenty cases, 70 per cent. of which were cured or benefited. When in the neck, the operation is quite safe even when the cysts are adherent to the chest wall. When complicated by a pneumothorax the operation is both difficult and dangerous, although the danger may be minimized by operating in a pneumatic chamber. It will suffice usually to resect a rib and establish drainage; total extirpation is rarely possible because of the dense adhesions.

Sarcoma of the Pleura and Diaphragm. Primary sarcoma of the pleura is a rare affection. It developed in a young man, twenty years of age, and involved the thoracic wall, pleura and both the parietal and diaphragmatic surfaces of the pleura. Demginsky¹ performed a rather formidable operation in which he resected the thoracic wall from the seventh to the eleventh ribs, removing the tumor together with two-thirds of the left half of the diaphragm, the free edge of which was sutured to the seventh rib. The patient recovered from the operation without any apparent respiratory difficulties.

CHYLOTHORAX. Very few cases of traumatic chylothorax have been observed. Last year Hahn was able to collect only nine cases, and since then two cases have been observed, one by Lindstrom. The latter's patient sustained a severe contusion of the chest which caused pain in the breast, combined with difficulty in respiration. On examination, a fracture of the eighth left rib near the angle was found, with contusions of the part, and with physical signs suggestive of a right-sided hæmothorax. The area of dulness steadily increased, and with it the dyspnoea, although the symptoms did not become severe until the third or fourth day after the accident; the pulse was rapid, but the temperature normal. The fluid recovered by an exploratory puncture resembled a mixture of blood and pus, but on microscopic examination proved to be chyle. The dyspnoea was repeatedly relieved by thoracocentesis until the patient began to show signs of marked inanition, when a thoracotomy was determined upon. A tear in the pleural sac near the vertebral column was discovered, but owing to the patient's condition, could not be sutured; accordingly the rent and the pleural sac were

¹ Arch. Générales de Méd., August 8, 1905.

tamponed with gauze. The patient partially recovered from the shock, but died shortly after the operation. The autopsy revealed a tear in the thoracic duct near the broken rib, but no collateral lymph vessels in the neighborhood could be discovered. In nine of the eleven cases observed, the chylothorax was right sided, and in those cases complicated by a fractured rib, the latter was on the opposite side. The prognosis as a rule is grave, the mortality being about 40 per cent. In some cases the effusion has been absorbed spontaneously, while in others repeated tapping has been necessary.

The Pericardium. PARACENTESIS PERICARDII. In a series of fifty-six cases of pericarditis there were four in which Doehert¹ was called upon to practice paracentesis for the removal of a pericardial effusion. In the first case, the pericardium was aspirated three times in the fifth left interspace near the sternum and four and one-half ounces, thirty-seven ounces and seven ounces of fluid were withdrawn. The patient, however, did not rally and later died of myocardial degeneration. In the second case the needle was introduced in the same location, but became blocked and as the patient's condition was alarming, the attempt had to be abandoned; death followed eight days later.

The two remaining cases were successfully aspirated on the right side of the sternum, according to the method of Schaposchinioff. After one ineffectual attempt to aspirate the pericardium, the patient's condition growing worse, a needle was introduced in the fourth interspace, at the right parasternal line, and one and one-half ounces of fluid withdrawn. The subsequent withdrawal of nine ounces afforded considerable relief and diminution of the area of cardiac dulness. Death finally resulted from endocarditis. The last case suffered from both pericardial and pleural effusions of rheumatic origin. The first attempt recovered less than one-half ounce of fluid, the needle being inserted in the fourth right intercostal space. A second attempt was made, when the patient was in a state of collapse, but with negative results. The patient was then raised and the needle introduced in the same space, about one inch to the right of the sternum and ten and one-half ounces were recovered. The condition immediately improved. The case is of importance because it supports the view of many observers that the heart in pericardial effusions sometimes floats upon the fluid and is not always displaced posteriorly, as was formerly believed. This view is further strengthened by the reports of cases showing the presence of fluid behind the heart, as in a case of Fränkel's, where the organ was compressed against the chest wall by the effusion. The practical significance is apparent, for if an attempt at aspiration fails, the patient

¹ Berliner klin. Woch., May 2, 1905.

should be elevated and the body inclined forward; failure will then only occur when the anterior surface of the heart is adherent to the pericardial sac.

A NEW METHOD FOR OPENING THE PERICARDIUM. From his experience at the autopsy table, Bacon¹ has been impressed with the frequency of pericarditis as a complication of other diseases, and the ease with which the pericardium may be reached through the sternum. Owing to the intimate relation of the pericardium with the sternum he believes the heart should be approached by the sternal rather than the costal route. In the operation, which he worked out on the cadaver, a skin incision is made parallel to the mid-line of the sternum and 0.5 cm. to its left, extending from the level of the upper border of the fifth to the lower border of the sixth costal cartilage, thus exposing the sternum. The periosteum is stripped, the bone trephined, the prepericardial fat dissected away with toothed forceps, and the pericardial sac grasped with forceps and incised. If pus is present, 15 per cent. iodoform wax may be used to protect the bone from infection and to prevent hemorrhage. A rubber tube is inserted for purposes of irrigation and drainage, gauze being packed around the tube to prevent infection of the anterior mediastinum. The advantages obtained by this measure may be summed up thus: it is anatomically correct; the approach to the pericardium is by landmarks readily made out, drainage is provided for in the best possible manner; ready inspection of the affected parts is permitted; mechanical dangers, including hemorrhage and rupture of the pleura, are obviated, the operation, not requiring more than five to fifteen minutes, may be done under nitrous oxide, the danger of infection spreading to the pleural cavities or peritoneum is slight, and finally there is no after deformity. The simplicity of the operation and its advantages are such that the author believes it should be resorted to more frequently; that cases should be operated upon early in order to prevent myocardial degeneration through absorption of toxins. He recommends it as a conservative measure for all cases of pericarditis with purulent or large serous effusions, and for those cases of fibrinous pericarditis not reacting to rest and the application of the ice-bag.

SUPPURATIVE PERICARDITIS. This condition developed secondarily to a suppurative arthritis of the left ankle and the metatarsophalangeal joint of the large toe. The primary focus was an osteomyelitis of the tibia, which Murray² considers a rather frequent forerunner of suppurative pericarditis. The symptoms were suggestive of a pericardial complication and the diagnosis was confirmed by the exploring needle. An incision was

¹ American Journal of the Medical Sciences, October, 1905.

² Lancet, January 21, 1905.

made in the fourth intercostal space, three-fourths of an inch to the left of the sternal border, the sac opened, irrigated and drained. Some difficulty was experienced in providing for thorough drainage, but this was overcome by removing a portion of the seventh costal cartilage, and keeping the patient propped up in bed.

The Heart. CARDIOLYSIS. The presence of adhesions between the layers of the pericardial sac or between the pericardial sac and the neighboring structures, especially the anterior thoracic wall, may seriously impede cardiac action, and cause failure of compensation. The operation known as cardiolysis recommended by Bauer¹ is applicable only to those cases in which the heart muscle is well preserved and in which there is well-marked retraction of the chest wall during systole. If there is much muscular degeneration the operation would fail because even after freed from adhesions the heart would not be able to maintain compensation. It is evident, therefore, that the operative indications are somewhat limited. A decision can be reached only after the presence of myocardial disease has been eliminated. To the successful cases already reported, Umber adds another. He observed in his patient a second sound, occurring during diastole, which was also synchronous with the recoil of the chest; this he attributed to the action of the heart and not to vibration of the wall, since it persisted after the operation. These symptoms taken in connection with the collapse of the veins in the neck during diastole are of great importance in the diagnosis of adhesions between the pericardium and mediastinum.

SUTURE OF THE HEART. During the past three years I have made an effort to collect all the cases of heart suture which have been recorded in literature, and in the March, 1905, issue of *PROGRESSIVE MEDICINE* will be found a summary of seventy-one cases. During the past year I have been able to collect from various sources thirty-one cases, ten of which appear in various journals during the current year, and the remainder being those which hitherto escaped my notice. In comparing statistics in the summary of the past year with those of the present, I find that there is very little difference in the percentage of deaths and recoveries. The mortality of the seventy-one cases last year was 56 per cent. and of the one hundred and two cases this year, 58 per cent., that is to say, there were two per cent. more deaths and two per cent. less recoveries. As we should expect, in the majority of those cases collected in the past year the wound was in the left ventricle. The left ventricle was injured fourteen times, the right ventricle, eleven times, the left auricle once, the right auricle three times, the septum once, and the apex three times. For reasons which have been dwelt upon in previous communications,

¹ *Therapie der Gegenwart*, xliv., p. 538.

the mortality is very much higher in wounds of the right than in wounds of the left ventricle.

The following is a record and summary of the cases occurring during the past year: Hesse¹ operated on a case one hour after the injury was received. A portion of the fourth rib was resected, the third divided, a wound in the pericardium disclosed, and on opening the sac, the injury to the heart was seen. The cut was located 2 to 3 cm. above the apex parallel with the long axis of the left ventricle, and was closed by three sutures of fine silk. The pericardial wound was sutured by cat-gut, a rubber drainage tube inserted, and in spite of an intercurrent pericarditis and pleuritis the case recovered. Of Grekow's² three cases the first sustained a stab wound of the left ventricle, the lesion being one-half cm. long and followed by slight hemorrhages. While introducing the sutures, the heart stopped and an irregular diastole followed, but when the knots were tied, cardiac action was resumed. The pericardium and skin incision were closed and healing followed without infection. In the second case—a stab wound of the heart—the operation was performed five hours after the injury. The wound in the left ventricle was closed by silk sutures, but death resulted from beginning pleuritis and pericarditis, and fatty degeneration of the myocardium. The third case was wounded in a similar manner, the knife-blade penetrating the right ventricle and caused a wound one and one-quarter cm. long. The wound was closed and the case progressed satisfactorily until the thirteenth day, when death resulted from pericarditis. The latter was not recognized and, if the effusion had been aspirated, the patient might have recovered as the heart wound was completely healed. The right ventricle was injured in Delorme's³ case, and the pericardial sac was full of clotted and fluid blood. The wound was closed with difficulty, as the sutures cut through and considerable bleeding followed. The case was further complicated by a suppurative pericarditis and pleuritis, but eventually recovered. The patient operated upon by Rothfuchs⁴ had a double wound of the heart, caused by a bullet entering the left ventricle four cm. above the apex, and penetrating the posterior wall. After the wound was closed there was an immediate improvement, but later a peritonitis developed and the patient died. The autopsy disclosed a wound of the diaphragm and stomach, the only case of the kind recorded in which this complication occurred in connection with a wound of the heart. The author believes that this accident is only possible in cases in which there is a high position of the diaphragm, or when the heart is enlarged.

¹ Zentralblatt f. Chirurgie, 1905, No. 43.

² Russ. Archiv. f. Chirurgie, 1904.

³ Bull. et mem de la Soc. de Chir., 1905, No. 6.

⁴ Deutsche Zeitschrift f. Chirurgie, May, 1905.

Neumann¹ after an unsuccessful attempt to sew a wound in the anterior wall of the right ventricle was able to oppose the surfaces by inserting the needle through the pericardium on the left side, then through the two cut portions of the muscle to the pericardium on the right. The ends of the suture were tied over a compress placed on the outside of the sac. Although the case did not recover, the writer believes the method useful in certain cases in which the muscle is degenerated, and particularly if the injury affects the right ventricle. The left auricle was wounded in Guiliano's² case and the wound was closed with silk sutures. Recovery followed and some months later the heart sounds were normal and the patient complained merely of oppression when he lifted heavy objects. A favorable result after suturing a wound in the left ventricle was obtained by Borchardt;³ a laparotomy was also performed because of the possibility of a gastric perforation from the same accident, but this lesion was not found. It was necessary in Lejar's⁴ case to make traction on the pedicle of the heart in order to bring the wound in the right ventricle into sight. The wound was sutured but the patient died; at the autopsy the sutures were found intact and death was attributed to other causes. The following is a table of thirty-one cases not included in the tables of 1903, 1904, and 1905:

No.	Operator.	Chamber Wounded and Size of Wound.	Results and Remarks
72.	Hesse.....	Apex; three silk sutures.	Recovery.
73.	Grekow.....	Left ventricle; sutured.	Recovery.
74.	Grekow.....	Left ventricle; silk sutures.	Death from pericarditis.
75.	Grekow.....	Knife wound of right ventricle, 1½ cm. long.	Death from pericarditis.
76.	Delorme.....	Wound of right ventricle.	Recovery complicated by pleural pericarditis.
77.	Rothfuchs....	Bullet wound of left ventricle; sutured. At autopsy wound of diaphragm and stomach.	Death.
78.	Neumann.....	Wound of right ventricle; sutured.	Death.
79.	Guiliano.....	Wound of left auricle; closed with silk sutures.	Recovery.
80.	Borchardt....	Wound of left ventricle; sutured.	Recovery.
81.	Lejar.....	Wound of right ventricle.	Death.
82.	Brachini. Clin. Chirurg., Milan, August, 1901.	The interventricular space; wound 2 cm. long; 3 silk sutures 2 complimentary stitches.	Death 42 hours after the operation of infection
83.	Brachini. <i>Ibid.</i>	Two wounds in the left ventricle, one 10 cm. long and deep, the other 3 mm. long and shallow; 2 sutures.	Death after operation.

¹ Berliner klin. Woch., 1905, No. 21.

² Gaz. degli ospedali, March 12, 1905.

³ Deutsche Med. Wochenschrift, 1905, No. 9.

⁴ Bull. et mem Soc. Chir., Paris xxxi. No. 14.

No.	Operator.	Chamber Wounded and Size of Wound.	Results and Remarks.
84.	Colombini. Giornale della r. Acad. de Med. di Torino, April, 1903, p. 262.	Penetrating wound of the apex; 3 metallic sutures; recovery complicated with purulent pleurisy.	Recovery.
85.	Guenot. Bull. Medica, 1904, No. 50.	Wound on the anterior face of the left ventricle above the apex; 2 catgut sutures, 3 superficial sutures.	Death of pericarditis and pleurisy 53 hours after the operation.
86.	Guinard. Bull. et mem. de la soc. de Chir. de Paris, June, 1904.	Wound of the left ventricle, 5 cm. from the apex. Perforating interrupted catgut sutures.	Death 48 hours after operation from anemia.
87.	Isnaldi. Clinica Chirurgica, 1903, No. 5.	Transverse wound on the sternum at the insertion of the 5th cartilage, 3 cm. wide. Wound on the anterior surface of the right ventricle, 1 cm. long, transverse.	Recovery complicated by pleurisy.
88.	L'Isanti. Rif. Medica, 1899, Vol. 4, p. 765.	Wound at the apex.	Perfect recovery without complications. Six months later slight aneurysm of the heart.
89.	K o s i n s k i. Kronika lekarska Varsovie, 1899.	Wound of the right ventricle; suture by 5 sutures.	Recovery.
90.	Mancini. Janari Policlino, Rome, 1903, Surg. Sec., No. 5.	First wound 1 cm. long with fringed edges at the base of the left ventricle; a second in the same chamber which was closed by 3 sutures.	Death the 4th day, sero-fibrinous pleurisy.
91.	Pomara. Gazz. degli Ospedali, 1902, No. 129.	Wound near the apex in the left ventricle; 4 sutures.	Death 73 hours after operation of purulent pleuropericarditis.
92.	Riche. Soc. de Chirurgie, May 11, 1902.	Wound of 5 mm. in the right ventricle; 3 sutures.	Recovery, perfectly well 3 years later.
93.	Savarand. Congress Francaise de Chir., 1902.	Wound in right ventricle; closed with 3 sutures.	Death 52 hours after operation from infection.
94.	Tummi (Momburg). Veröffentlichungen aus dem Gebiete des Militär sanitätswesen ueber penetrirende Brustwunden und deren Behandlung, 1903, No. 19.	Penetrating wound of the heart, sutured, chamber not stated.	Recovery complicated by slight empyema.

No.	Operator.	Chamber Wounded and Size of Wound.	Results and Remarks.
95.	Velo. Reported by Terrier and Reymond to the French Congress of Surg. in 1902.	Wound at the apex 15 mm. long, 3 catgut sutures.	Death on the 4th day. Patient an alcoholic, death attributed to condition of the myocardium.
96.	Weinlechner. Wienerklinik, April, 1904.	Suspected wound of the right ventricle not found at autopsy; small superficial wound; 2 superficial sutures.	Death 42 hours after the operation. Wound found in left ventricle; adipose degeneration of the myocardium.
97.	Wennerström. Upsala Lake-reforenings. Forhandlungar, Vol. 18, p. 65.	Wound 2 cm. long on the left ventricle; 1 catgut suture and 4 silk sutures.	Perfect recovery.
98.	Wolff. Cologne: 33d German Congress of Surg., May, 1903.	Wound of the right ventricle; sutures.	Death after 15 days from pericarditis and empyema.
99.	Bougle. Soc. Anat., Feb., 1901.	Two wounds in the right ventricle; both sutured.	Death 5 hours after operation.
100.	Morestin. Archives General de Medecine, 1903, No. 38.	Small wound in right ventricle; 5 sutures.	Sudden death on 2d day from embolism.
101.	Riche. Presse Medicale, April 27, 1904.	Revolver shot grazed the left ventricle. Attempted suture of the 2 wounds of the heart.	Patient died on operating table.
102.	Guidone. Gaz. interna di med. pratica, Naples, April, 1900.	Very deep wound 3 cm. long found on left ventricle.	Death occurred on operating table.

SUMMARY.

	Cases.	Per cent.
Total number of cases.....	102	..
Number of deaths.....	60	58
Number of recoveries.....	42	42

	Cases.	Died.	Recovered.	Mortality.	Recovered.
Right ventricle	33	22	11	66 $\frac{2}{3}$ %	33 $\frac{1}{3}$ %
Left ventricle.....	49	27	21	56	44
Right auricle.....	3	1	2	33 $\frac{1}{3}$	66 $\frac{2}{3}$
Left auricle	1	..	1	..	100
Left apex.....	6	3	3	50	50
Coronary artery.....	1	1	..	100	..
Septum between.....	2	1	1	50	50
Seat of wound not stated.....	8	5	3	63	37

RESUSCITATION BY MASSAGE OF THE HEART. This operation was first suggested by Maurice Schliff in 1874 but it was not until 1898 that it was applied to man. Since that time a number of cases have been reported in which this method has been resorted to, and in a few instances successfully. In a majority number of cases the patients have been resuscitated but only for a few minutes or for a few hours. It is only the small minority that have been permanently restored to life. This rather sensational operation has therefore passed beyond the experimental stage and must be recognized as a thoroughly established procedure. (The matter has been discussed somewhat at length in the March issues of *PROGRESSIVE MEDICINE* for 1904 and 1905, and reference will be made here only to those articles which have appeared in the past year.)

In the case of children the heart may be manipulated without an open operation because the costal cartilages are sufficiently elastic to permit of pressure upon the heart between them and the spinal column, and while this method has been used upon adults it is not so effective as when massage is applied directly to the heart, either by the thoracic or by the subdiaphragmatic transperitoneal route.

Conkling's¹ case sustained a severe razor cut of the chest, by which the soft parts, pectoralis major and minor, and the second, third, and fourth ribs at the cartilagenous junction were severed. During respiration a large portion of the left lung protruded from the chest. The muscles were sutured, and the wound partially closed, when it was noticed that the patient was in a state of collapse, which did not respond to stimulation and artificial respiration. Conkling then inserted his finger into the pericardial sac through the wound, and felt a perfectly still heart; he then thought of resuscitation and manipulated the heart through the pericardial wound for forty to sixty seconds when he felt a thrill. In three to five seconds this was followed by contractions which gradually increased in strength; the wound was hastily packed, and the patient made an uneventful recovery. The author believes that fully two minutes elapsed from the time the heart stopped beating until he began his manipulation, and forty to sixty seconds before any response from the heart was apparent. The conditions were not so favorable in Cheever's² case, for the child was greatly weakened by sepsis. During an examination preliminary to the evacuation of the post-pharyngeal abscess the child went into collapse: the pulse ceased, the heart sounds were not audible, and the child was evidently dead. The abscess was evacuated, artificial respiration and cardiac massage immediately

¹ New York and Philadelphia Medical Journal, September 2, 1905.

² Boston Medical and Surgical Journal, January 5, 1905.

instituted through the chest wall. Immediately the color returned to the lips and face; the capillary circulation had evidently been established, but no heart sounds could be heard. Efforts were abandoned four hours later when rigor mortis was established. The case is interesting because of the failure to restore life after the circulation was restored and the blood fairly well oxygenated, and differs from others, in that automatic cardiac pulsation was not re-established, the blood having been forced through the vessels by mechanical pressure. It might be advisable to do a preliminary tracheotomy in these cases, deferring the evacuation of the abscess until the general condition was improved; artificial respiration, if it were indicated, could be readily practised through the tube.

Because of a laryngeal obstruction caused by a carcinoma, Gray¹ was forced to do a hasty tracheotomy upon a woman, aged fifty-five years. She grew progressively worse, not responding to the usual methods of stimulation, or external cardiac massage. Four or five minutes after the tracheotomy the abdomen was opened, and the heart felt in an absolutely flaccid condition. Cardiac compression, at the rate of 70 or 90 times per minute, was tried and after four minutes the heart became firm and began to beat 30 to 40 times to the minute. Massage was continued for a few seconds and soon the beats were vigorous, the color returned to the face and lips, the pupils contracted, pulsation was visible in the carotids, and voluntary respiration was restored. The patient later became weaker and died three hours after the cardiac manipulation was first applied. Probably ten minutes elapsed in this case between the cessation and restoration. The same author had a similar experience during a laparotomy for an ovarian cystoma. As artificial respiration was of no avail, he grasped the heart through the diaphragm, and found it absolutely relaxed; after squeezing it a few times, the heart action became re-established and the patient recovered.

¹ *Lancet*, August 19, 1905.

INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA.

By ROBERT B. PREBLE, A.B., M.D.

THE literature of infectious diseases during the past year has shown certain striking peculiarities, the most conspicuous of which is the paucity of articles which really mark an advance in our knowledge. Many of the articles have been detailed considerations of well-known phases of disease. For example, the question of perforation in typhoid fever has been very thoroughly considered by a number of authors, and while the articles cannot be considered as actual additions to knowledge, they are extremely useful in the way of accentuating certain facts. Another peculiarity of the year's work is the almost complete disappearance of certain subjects. Two years ago the literature was full of the subject of tetanus; last year a few articles appeared, while this year almost nothing has been written. Why this should be cannot be stated, but is certainly not because the last word has been said on the subject nor because the disease has disappeared. So, too, the number of articles upon diphtheria and malaria are notably less. Even the never-failing discussion of tuberculosis has fallen off and nothing new has been said. Behring's announcement of a cure made in the Tuberculosis Congress has attracted an amount of attention which it is to be hoped the subject will deserve. Behring's standing is such that any statement from him must be carefully listened to, even though one may not agree with his ideas upon the subject of the unity or duality of the bovine and human tuberculosis or the route of infection most commonly present in the human.

The report of the Typhoid Commission, appointed to study the question of typhoid as it occurred during the recent Spanish-American war, has appeared and contains a great amount of information. The report, however, is too extensive to permit of anything more than cursory reference to it under Typhoid Fever. The report of the Pneumonia Commission of New York has appeared in part, but many of the details are still to be worked out. It is to be hoped that both of these commissions will publish supplementary reports in which the

most important results of the work done are given, freed from the immense amount of data which must be included in the completed report. It is only in this way that the work of the commission becomes available to the mass of the profession.

Pneumonia has received rather less attention than usual. There have been fewer articles than usual based upon the long series of cases and less discussion of the subject of treatment. Two drugs which have been in use for years have been urged anew and both in very large doses—namely, guaiacol and quinine. It is interesting to see the enthusiasm with which some men take up these things, never apparently becoming discouraged by the failure of others to get similar results or by the fact that the method advocated has been previously tried and abandoned.

There have been two or three articles upon pneumonia in German which have attracted my attention, not because of their value but because they show the provincialism which often characterizes both German and French literature. They ignore as long as possible all facts stated by others than their own countrymen. It is really interesting to see them publishing cases of pneumococcus septicæmia and drawing conclusions as to prognosis from the presence of pneumococci in the blood, apparently entirely ignorant of the fact that pneumonia is always a septicæmia and the pneumococci are always present in the blood.

There have been two diseases which have been discussed more fully than for years because of their appearance in epidemic form. Cerebro-spinal meningitis has been more or less generally epidemic over the entire civilized world, but notably so in New York. Yellow fever has been epidemic in New Orleans and the Southern States and has furnished a new opportunity to demonstrate the relation of the mosquito to the diffusion of the disease. While the ancient methods of quarantine and fumigation were practised, the main work was done along the lines suggested by the mosquito theory, with the result that the disease was controlled in a much shorter period and the number of cases much smaller than in former similar epidemics. The diffusion of the knowledge of the importance of the mosquito as a carrier of disease to the layman has been quite complete and must bear fruit in many ways. The general public will much more easily absorb the fact that many other diseases are insect borne, and that flies, mosquitoes, and the like are something more than mere torments to be endured with such philosophy as each may possess, but are rather serious menaces to health and life, and are therefore to be actively fought and destroyed.

Insect Transmission of Disease. The subject of the relation of various insects to the transmission of certain diseases is reviewed by Albert,¹

¹ New York Medical Journal, 1905, vol. i. p. 220.

and while the bulk of this work has been reviewed in previous numbers of *PROGRESSIVE MEDICINE*, the matter is of so great importance that it might be convenient to assemble the information. The diseases transmitted in this way are of two sorts—those due to animal parasites and those due to various bacteria. So far as present information goes, in all instances of the former group the causal organism goes through certain developmental changes essential to their perpetuation. In this group the various types of malaria are the most conspicuous and important. Here, too, probably belongs yellow fever, trypanosomiasis, dengue, and the Texas fever of cattle. The number of bacterial diseases transmitted in this way is longer and includes typhoid, tuberculosis, plague, cholera, elephantiasis, relapsing fever, leprosy, anthrax, and pus infection.

The insects which transmit disease are the mosquito, the common house-fly, the fleas, the ticks, the bed-bugs, the tsetse-fly, and lice. The way in which they transmit disease varies. In many instances they serve merely as carriers of infection, picking up infective material and depositing it either with or without its passage through the intestinal tract. The most important example of this sort is the common house-fly, and the influence which these pests have upon the diffusion of typhoid fever and tuberculosis is only beginning to be generally appreciated. The spirillum of Asiatic cholera and the plague bacillus have both been found in the body of the fly. It is more than probable that other bacteria also are transferred in the same way.

In other instances the insect serves not only as a carrier of an infection but also actively inoculates the patient. Fleas, lice, bed-bugs, ticks, and the tsetse-fly act in this way. Fleas, particularly the rat flea, is responsible for a considerable part of the transmission of the bubonic plague. Bed-bugs transfer the common pus cocci, probably also other bacteria, and Karlaiski has recently shown that they play an important part in the transmission of relapsing fever. The relation of the tick to the transmission of Texas fever was proven long ago by Theobald Smith. The relation of the tick to the spotted fever of the Rocky Mountains is now seriously questioned, although such a relation seemed well established by Wilson and Chowning. Dewevre has experimentally demonstrated the diffusion of impetigo contagiosa by the common head louse.

A third method of transmission is illustrated by the mosquito, which serves as a host in whom certain developmental changes in the infecting organism take place, and after these are completed the mosquito serves as an inoculator. The only perfectly studied example of this is malaria. The relation of the mosquito to the diffusion of yellow fever is well established and strongly suggests that the cause of this disease is a protozoa, either the one or similar to the one recently described in New

Orleans, to which reference will be made later. Although Albert states rather definitely that the rat flea diffuses the bubonic plague, a method of infection strongly advocated by the Health Board of Sydney, the question cannot be regarded as definitely settled, as is shown by Herzog,¹ who reviews the literature of the *insect transmission of plague* and reports some personal experiences. The conclusion of this review is that the evidence is not conclusive and that the preponderating probability is that the rat flea is not active in the transmission of plague. Experiments with flies, which have been given an opportunity to feed upon the viscera of patients dying of plague, show that while the flies carry the bacilli they cannot infect guinea-pigs which are exposed to their bite.

Herzog reports a personal observation in which he thinks it possible that the infection was carried by pediculi.

A number of articles have appeared during the year upon the role played by *milk in the diffusion of epidemics*. Robertson² reports an epidemic of *scarlet fever* which was due to the sale of milk by a family in which two children were ill from scarlet fever. The children were removed, the house and shop fumigated, but the cases continued to occur and it was then found that the mother had red and swollen tonsils. She also was sent to the hospital and the outbreak came to an end.

Stokes³ describes an outbreak of *typhoid fever* in a factory employing 1500 women and 400 men. At lunch the women were supplied with milk and the men with beer. As many as 200 of the women were ill at a time, but none of the men became sick. The milk came from a dairy which was unsanitary, and on examination showed 4,500,000 bacteria per centimetre. The milk was stored in a room neighboring upon a closet and flies passed freely from one room to the other. The milk supply was cut off and the epidemic ended at once.

Diphtheria. Many of the questions, particularly the most important of all concerning this disease, may be regarded as definitely settled. There is now left no one whose opinion is based upon much experience who is in doubt about the therapeutic value of the diphtheria antitoxin. Articles reporting the effects of the serum in long series of cases have notably decreased in number and there is now no reason for them. Everywhere the antitoxin is being used in larger doses with correspondingly better results. The importance of large doses must be still further urged, for one still sees children who have been given insufficient amounts of the serum and are suffering the effects. The early use of large and

¹ American Journal of the Medical Sciences, January, 1905, p. 504.

² Public Health, April, 1905.

³ Journal of the American Medical Association, February 25, 1905.

yet larger doses is the method of success. One can easily give too little but cannot possibly give too much.

A short article by Kraus,¹ of the Serotherapeutic Institute of Vienna, points out a fact which is interesting and important—namely, that diphtheria antitoxin serum, while it deteriorates somewhat, does so but very slowly, usually not more than 100 units in one to two years, and that in shorter periods there is no loss whatever.

McCullom² has an interesting review of nine years' experience in the treatment of diphtheria with antitoxin, in which he accentuates certain well-known facts. He insists upon the importance of a bacteriological examination of all suspicious throats, and one must agree with the statement that no matter how much experience a man may have in the treatment of diphtheria, instances frequently occur where it is impossible for a correct diagnosis to be made without the aid of a culture. While it must be admitted that error may be made even by this method, they are infinitely less numerous than those made by other clinical methods, and care in making the cultures can still further reduce their number. Care must be taken to secure the culture directly from the membrane and not indefinitely from any part of the mouth. It is especially important to take cultures from the nose in all cases which are the least suspicious. This is practically the only way in which the diagnosis can be made, and McCullom has during the past year been able to prevent the outbreak of an epidemic of diphtheria in institutions by means of the prompt recognition of diphtheria by cultural diagnosis.

In laryngeal diphtheria cultures may be of no assistance because the membrane is located entirely below the point which can be reached by a swab. In these cases the diagnosis must be made by the clinical symptoms. Experience has led McCullom to conclude that where there is marked dyspnoea with rigidity of the sternocleidomastoid muscles with supraclavicular and substernal retraction, excluding a retropharyngeal abscess, peritonsillar abscess, and a tumor pressing upon the larynx, we have to deal with a case of laryngeal diphtheria. This is very true of the extreme cases but does not serve as a guide for the milder cases or for these severe cases at the time when the most can be done for them. My personal experience has led me to the arbitrary rule that a croup which continues longer than twelve hours should be looked upon as a diphtheria and treated as such. I fully realize that this rule will lead to error, but the errors will be on the safe side, and one will not see, as one too often does, cases of severe diphtheria of the larynx which have been treated as spasmodic croup for two or three days. It is fortunate that

¹ Jahrbuch f. Kinderheilkunde, Bd. lxi. p. 775.

² Boston Medical and Surgical Journal, January, 1905, p. 624.

the antitoxin is so perfectly harmless that one need not hesitate to use it even when the diagnosis of diphtheria is open to question. McCullom has for some time adopted the rule not to discharge any patient until two successive cultures from the throat proved negative, and finds to his surprise that the period of isolation of the cases is shorter than it was before the rule was adopted, when the time averaged fifty-seven and one-sixth days.

McCullom's article is illustrated by numerous charts showing the effects of the use of antitoxin upon the mortality rate of diphtheria and upon the mortality rate of laryngeal cases. He further points out that to get the best results the antitoxin must be given at the earliest possible moment and in large doses. Intubation is the operation of election in laryngeal cases, tracheotomy the operation of necessity.

Studies of the various complications and sequellæ have appeared in various places, particularly upon the cardiac and nervous complications. There have been several upon the antitoxin rashes and several upon the relation of fibrinous rhinitis to diphtheria.

CARDIAC COMPLICATION OF DIPHTHERIA. Dietlen¹ has made a study of the cardiac changes often following diphtheria, and for the first time, so far as I know, has employed the *x*-ray to determine the dilatation in these cases. The importance of these cardiac changes is not so generally appreciated as it should be, and one may be forgiven if each year some reference is made to the subject. The myocardial changes which underlie the clinical picture begin usually in the first half of the second week of the disease. Dilatation of the heart generally follows, coming on gradually, and reaches its maximum degree about the end of the third week. The apex and cardiac impulse become diffuse, the rhythm is lost, the heart tones become impaired and are often accompanied by murmurs, and the second pulmonary tone becomes accentuated.

The dilatation in the majority of cases begins to recede about the fourth week. In many cases it entirely disappears, while in others the effects persist for months and sometimes throughout life.

The degree of dilatation is not always paralleled by the pulse changes. The heart figure as outlined by percussion does not always correspond to the truth, lesser degrees of dilatation being frequently overlooked by this method, although distinctly shown by the *x*-ray. A high degree of dilatation is not incompatible with recovery.

Franklin W. White² publishes a report of a study of the cardiac complications in nearly 1000 cases of diphtheria made by him in conjunction with H. H. Smith. They found that while severe heart complications were relatively infrequent, moderate disturbances as shown

¹ Münchener med. Wochenschrift, 1905, p. 683.

² Journal of the American Medical Association, February, 1905, p. 1243.

by tachycardia, arrhythmia, and the presence of one or more murmurs were very common and in many cases persisted for a long time, making it a matter of importance to keep the heart under observation long after convalescence.

About one-third of the cases left the hospital with a pulse between 100 and 120, and approximately the same number had markedly irregular hearts. In about three-fourths of the cases murmurs were present with accentuation of the second pulmonic, leading to the probable diagnosis of relative mitral insufficiency due to changes in the heart muscle. The great frequency of these cardiac phenomena after diphtheria is in striking contrast to their occurrence after other acute infectious, such as typhoid, influenza, or pneumonia. This paper pays particular attention to an account of 78 cases of diphtheria with heart complications, after their discharge from the Boston City Hospital, and followed for periods ranging from five months to a year. The ages of these cases varied: 20 from one to five years; 33 from five to ten years; 17 from ten to sixteen years, and 8 adults. The sexes were about equally divided.

Most of the cases had murmurs with some cardiac enlargement, but 5 were followed because of persistent tachycardia, 6 because of continued irregularity, and 4 because of early cardiac enlargement out of proportion to the other signs. The duration of the symptoms varied, but since 65 of these cases have terminated the duration can be stated for them.

The following table shows the duration and the relative number of cases in the groups of moderate and severe cases. The time is calculated from the onset of the diphtheria:

	Moderate.	Severe.	Total.
Fourth to fifth week	4	0	4
Sixth to seventh week	14	4	18
Eleventh to twelfth week	11	10	21
Fifteenth to twentieth week	8	2	10
Twentieth to twenty-fifth week	1	1	2
Twenty-fifth to thirtieth week	0	3	3
Thirty-fifth week	0	2	2

Thirteen cases are still under observation. In a general way the symptoms disappear gradually after a period of from two to four months. As a rule the cases showing the most marked symptoms, such as marked irregularity, gallop rhythm, or reduplication, are slowest to recover, taking four to six months. There are, however, some striking exceptions to this rule.

In discussing what White calls the average type, he points out the lack of parallelism between the symptoms and the physical signs. The child may be playing and taking active exercise without experiencing any difficulty except perhaps a little palpitation or shortness of breath, and

yet show upon examination an enlargement of the heart with systolic murmur and accentuation of the second pulmonic sound.

An enlargement of the heart was present in 31 cases of the average or moderate type, and was usually more to the left than the right. Often the cardiac area increased during the first week after the patient left the hospital, presumably because of too much exertion. Murmurs were present in all but 17 cases after discharge from the hospital. They were always systolic, most often over the mitral area, often transmitted to the axilla, and usually accompanied by an accentuation of the second pulmonary tone. The murmur was thought in most cases to be due to a relative mitral insufficiency.

In the more severe cases the symptoms and signs did not differ in character but were more severe and in general persisted longer.

The prognosis is generally good, the cases clearing up sooner or later, but in 17 per cent. of the cases studied the disturbances were still present after five or six months and in 2 cases after as long as eleven months.

The treatment consists in rest in bed with tonics and then gradual and carefully regulated exercise.

In the discussion of this paper it was pointed out that the cardiac complications are more common now than they were before the introduction of the antitoxin. This is true also of other severe sequelæ and complications, and is explained by the fact that many cases now live to have complications which formerly died during the first few hours of the infection. Many of the cardiac complications can be avoided by the early and free use of the antitoxin.

The importance of the cardiac changes in diphtheria cannot be exaggerated nor be too frequently pointed out. Parents generally and doctors too frequently think that the child is well as soon as the throat is clear. This mistaken notion is the source of much danger to the patients, and were it not for the marvellous recuperative power of children, heart failure would be more common after diphtheria than it is.

It will be a matter of interest and importance to follow these same or similar cases for long periods to determine whether eventually more chronic changes develop in the heart and bloodvessels similar to those produced by the typhoid infection.

DIPHTHERITIC PARALYSIS. Another result of diphtheria which has been carefully studied anew, since the last article upon infectious diseases was prepared for *PROGRESSIVE MEDICINE*, is that of paralysis. Rolleston¹ has published two articles—one upon clinical observations on diphtheritic paralysis and the other upon the Achilles jerk in diphtheria—and both are distinct additions to the literature. The question of

¹ Practitioner, November and December, 1904.

the frequency of occurrence of diphtheritic paralysis has been often discussed, and in general the conclusion is that it is much more common now than during the preantitoxin days. Long series of cases published in 1877 and 1887 by Sanné and Cadet de Gassicourt place the percentage of frequency at 11 and 13.6 per cent. If one excludes from the total those cases of croup, dying immediately after tracheotomy, and the toxic cases which succumbed before paralysis had time to develop, the percentage rose to 23.76 per cent. Since the employment of anti-toxin in the hospitals of the Metropolitan Asylums Board in London, a period now of seven years, 50,871 cases of diphtheria have been treated with 9936 cases of paralysis—that is, a percentage of 19.53. The lowest percentage in any one year is 15, and the highest 20.5.

There are several factors which contribute to this increased frequency: first, before the discovery of the Klebs-Loeffler bacillus many cases of mild diphtheria were overlooked; second, before the days of the anti-toxin many cases died so rapidly there was no time for paralysis to develop; third, many patients passed from observation when convalescence was established and any subsequent paralysis escaped notice; and lastly, many cases of mild paralysis were regarded as due to asthenia rather than to actual paralysis.

The relation of the severity of the diphtheria to the subsequent development of paralysis has been much discussed and various opinions have been held. Some have thought there was no relation at all, others that paralysis was most common after the severe diphtheria, and still others have thought the mild cases most apt to be followed by paralysis.

Rolleston has studied 500 cases of diphtheria and finds that the number of cases of paralysis is directly proportional to the severity of the diphtheria as shown by the following table:

A. Faucial Cases with or without Nasal or Laryngeal Involvement.

	Cases.	Paralysis cases.	Percentage.
Very severe	39	32	82.05
Severe	96	49	51.04
Moderately severe	40	7	17.5
Moderate	152	22	14.4
Mild	144	5	3.4
Very mild	24	0	0.0

B. Nasal Cases Only.

Moderate	1
Mild	1
Very mild	1
No paralysis.	

C. Laryngeal Only.

Severe cases requiring tracheotomy, no paralysis	2
------------------------------------------------------------	---

Of the 39 severe cases 5 died of toxæmia before there was time for the development of paralysis.

Though as a rule there is a definite relation between the initial disease and the frequency and degree of subsequent paralysis, yet severe and even fatal paralysis may follow a mild attack of diphtheria. In this latter group of cases the patients are probably allowed to return to their activities too soon. Rolleston's experience leads him to conclude that enforced rest for a certain period, the longer the more severe the attack, is the surest prophylactic against subsequent paralysis. Keeping the patient recumbent is often enough to ward off paralysis completely in the milder forms and to render it less extensive in the severer. This no doubt is the reason why in the Asylums Board's Fever Hospitals paralysis is less frequent after the mild forms of diphtheria and why in private practice, in general hospitals, and in hospitals for nervous diseases, where the patient may first seek advice some time after the acute attack, mild initial lesions are followed by severe paralysis.

Influence of sex upon the paralysis is not very marked; males show a slightly higher percentage of paralysis.

Various observers differ as to their opinion of the influence of age upon the occurrence of paralysis. Rolleston's figures show that the percentages do not differ greatly during the first three five-year periods of life, being in order 29.3 per cent., 23.7 per cent., and 26.46 per cent., but more than one-half of all the cases occur during the period between three and six years. It rarely occurs before three and is fairly frequent up to sixteen. He met it but twice in 67 patients over fifteen years of age. From this one must conclude that paralysis is more common in children than in adults, and it may be added that the paralysis is more apt to be severe.

One of the most interesting tables is that showing the relation of paralysis to the day of disease on which antitoxin was given:

Day of disease.	Paralysis cases.	Percentage.
First day	1	5.5
Second day	16	15.09
Third day	28	18.7
Fourth day	27	28.7
Fifth day	21	35.0
Sixth day	15	34.9
Seventh day	4	19.4
Ninth day	1	50.0
Eleventh day	1	50.0
Thirtieth day	1	100.0

The early administration of large doses of antitoxin lessens the liability to subsequent paralysis, and if it does nevertheless develop it is less severe. The dosage used by Rolleston is given as follows:

Dosage of Antitoxin. Very severe cases received 18,000 to 24,000 units on admission and repeated once or twice; severe cases, 18,000 to

21,000 and repeated if required; moderately severe, 15,000 to 18,000; moderate cases, 9000 to 12,000; mild cases, 3000 to 12,000, and very mild cases, none at all.

The frequency of the various forms of paralysis is given as follows: palatal palsy, 72 cases; ciliary, 54; strabismus, 30; cardiac, 20; pharyngeal, 9; labial, 8; diaphragmatic, 7; laryngeal, 5; and sphincter, 2.

The term cardiac palsy is applied only to fatal cases in which death was ushered in by vomiting, restlessness, irregularity of pulse and change in the heart sounds. Had all cases of cardiac dilatation and irregularity been included, the number would have been much higher.

The time of onset of the various paralyses differs. Thus the great majority of the palatal paralyses occur during the second, third, and fourth weeks, the average day of onset being 24.6. The ciliary paralysis occurs later, mostly in the fourth and fifth weeks; the strabismus begins most often in the fifth or sixth week. The pharyngeal, labial, and diaphragmatic paralyses are still later, seventh and eighth weeks. The cardiac paralysis occurs during the first and second weeks. The duration of each form of paralysis can be approximately fixed:

Nature of palsy.	Average duration.	Maximum.	Minimum.
Palatal	25.8 days	65 days	4 days
Ciliary	17.8	46	5
Squint	17.1	47	7
Labial	16.8	21	8
Pharyngeal	12.3	26	5
Diaphragmatic	12.3	19	6

A striking feature of the majority of diphtheritic palsies is their abortive character. To many of them the term paresis rather than paralysis should be applied. This is one reason why so many cases are overlooked.

Another peculiar characteristic of these cases is their fluctuating character. A slight impairment of function is noted to-day, to-morrow it is no longer present, but after a few days it reappears.

The prognosis in these cases is generally good, for with the exception of early cardiac paralysis the tendency is toward recovery. Apathy, vomiting, restlessness, inequality or irregularity of pulse, weakness of the first heart sounds, gallop rhythm, and progressive enlargement of the liver are all valuable signs of threatening cardiac paralysis. To those listed by Rolleston may be added persistent anorexia without vomiting and an embryocardia. These symptoms almost invariably herald a fatal ending. Next to cardiac paralysis that of the pharynx and diaphragm are most to be feared. Asphyxia and aspiration pneumonia are the things to be particularly feared. The mortality of Rolleston's 115 cases was 17.39 per cent., or 4 per cent. of the 500.

Treatment, because of the incomplete development and short duration of many cases, is unnecessary. This is particularly true of the ocular

and faucial cases. When regurgitation of the food occurs the food should be taken slowly and all fluids should be thickened. In some cases nasal or œsophageal feeding may be required, while in others, and especially in those who show signs of cardiac weakness, rectal feeding should be employed. The hypodermic use of strychnine is of use in these cases.

In cases of cardiac paralysis death is almost invariable, no matter what the treatment. When this threatens the patient must be kept absolutely recumbent, not even raising himself to go to stool or to pass urine. The food should be given in small amounts and be readily assimilable. If vomiting occurs with cardiac symptoms no food should be given by mouth. If retching and vomiting continue, morphine in suitable doses and at appropriate intervals may be given. Adrenalin chloride and camphor may be given, and it is upon these which Rolleston especially relies. Strychnine he finds quite useless; "you might as well paint the bed with it."

Some years ago Mackenzie drew attention to the effects of diphtheria upon the knee-jerk and found it lost in 80 per cent. of 64 cases examined. The cases were in general severe and all seen before the days of anti-toxin. Rolleston¹ has studied the influence which this disease has upon the Achilles jerk and finds that making due allowance for the greater number of mild cases in his series and for the influence of the serum the effects are quite comparable to those upon the knee-jerk.

One hundred cases ranging from very mild to very severe were studied and in a general way the more severe the disease the greater the effect upon the reflexes. The reflexes may be merely reduced or they may be lost entirely, and while the severe cases may show either degree of changes, oftenest complete loss, the milder cases cause only a reduction in the activity. The effects upon the knee-jerk is greater than upon the Achilles jerk, and whenever the latter is affected the former is also.

Out of 20 cases in which the Achilles jerk was lost, 14 became paralyzed, and 12 of them severely. Of 27 in which the reflex became sluggish, 17 showed paralysis, of which 8 were severe. In cases where the knee-jerk alone was effected, the incidence of paralysis was much less. Thus in 31 where the knee-jerks were lost there were 17 cases of paralysis, 13 of them being severe. Of 38 with sluggish knee-jerks there were 12 cases of paralysis.

In all cases of definite paraplegia the knee-jerks and Achilles jerks were lost, but in some both were lost, although the patient was able to walk with but slight ataxia and Rombergism.

As a general rule the severer the case the earlier the Achilles jerks were lost, and usually they were effected after the knee-jerk. In some cases

¹ Brain, 1905, pp. 28-68.

these reflexes were unduly brisk in the early stages of the disease. Inequality of the reflexes on the two sides was noted in some cases. The return of the reflexes on the two sides was not always simultaneous and in every case the loss of the reflexes persisted after the paralysis had disappeared.

RHINITIS DUE TO THE DIPHTHERIA BACILLUS. Schaps,¹ of the Infant Home in Dresden, publishes an account of an epidemic of rhinitis among the suckling children in this institution. Nine children were taken sick simultaneously with a rhinitis, the discharge of which caused excoriations of the lips and nose. The temperature was normal and the children in all other respects well. In no case was the pharynx or larynx involved, and yet in all these cases the diphtheria bacillus was found. At this time the nasal secretions of all the other children were examined, and in a part which showed absolutely no clinical signs of infection the diphtheria bacillus was found. All the children were given immunizing or therapeutical doses of antitoxin as each case required, but in no case was there any specific influence on the rhinitis. The question as to whether the bacillus found was truly the diphtheria bacillus is at once suggested, but Schaps believes that in many cases at least it was the true and not the pseudobacillus. Animal experiments were partly positive and partly negative. Two of the nurses were taken sick with sore throat, one with a membrane upon the tonsils, and recovered promptly upon injection with the antitoxin.

This report is of interest because of the number of cases showing the bacilli and yet showing in many instances no symptoms and in others purely local effects. The explanation which occurs to one most readily is that the cases were not true diphtheria. This is suggested by the well-established clinical fact that while diphtheria bacilli may be present without causing symptoms, they usually become active; secondly, by the failure of the antitoxin to give results, and lastly, by the number of animal experiments which ended negatively. Of these objections the lack of results from the use of the antitoxin is a strong one. A large experience with the use of antitoxin will force one to conclude that when it fails to yield results the case is either not true diphtheria or the antitoxin has been given in insufficient amounts.

There is still another thought suggested by Schaps' experience. It is an old clinical experience that sucklings are not prone to take diphtheria. The usual explanation is that their method of feeding and inability to move around protects them. It may, however, be that they possess an immunity which prevents any effects from the diphtheria bacillus except local ones, and usually even these do not appear. If

¹ Archiv f. Kinderheilkunde, Bd. xl. p. 80.

this assumption were true it would explain the small number of cases showing any symptoms, the purely local character of these, the failure of the antitoxin to produce effects, and the infection of the nurses, over whose symptoms the antitoxin had its usual effects.

Fibrinous Rhinitis in Diphtheria. Gerber¹ has a careful report upon fibrinous inflammations of the nose and pharynx which brings emphasis upon certain points. In the first place he lays stress upon the important fact that it is not possible to determine the nature of a pseudomembrane without a bacteriological examination, not a new point, to be sure, but one which is frequently forgotten; secondly, the absence of constitutional symptoms does not warrant the inference that the given case is not diphtheritic.

Forty cases of fibrinous rhinitis were studied. Of these 29 were due to the diphtheria bacillus, and 21 of them—*i. e.*, 72.4 per cent.—were without general symptoms. Of the 11 cases due to other bacteria 7—*i. e.*, 63.6 per cent.—were free from constitutional symptoms.

Of 127 cases of *fibrinous pharyngitis* 56 were due to the diphtheria bacilli. In these cases records were kept to determine how closely the clinical diagnosis made agreed with the bacteriological report, and such agreement was found in 100 cases. Of 62 cases diagnosed as angina non-diphtheritica 9 showed the diphtheria bacilli; of 53 cases diagnosed as true diphtheria, 10 showed no bacilli, and of 12 doubtful cases 4 showed the specific organisms. Thirty-three cases of true diphtheria were without general disturbances, and 36 of the 71 cases of simple angina showed such symptoms.

Gerber thus points out that three-fourths of membranes in the nose are true diphtheria, while but one-half of those in the pharynx are.

Wolff,¹ of Frankfurt a. Main, reports 3 cases of rhinitis fibrinosa in which diphtheria bacilli were demonstrated and discussed in pointed fashion the relation of nasal diphtheria to rhinitis fibrinosa. Various authors have attempted to classify fibrinous inflammations of the nasal mucous membrane, separating from the diphtheria all cases in which the diphtheria bacilli were demonstrated but were unaccompanied by constitutional disturbances. This position appears extremely illogical to one who has had much experience with the pharyngeal diphtheria. Demonstration of the diphtheria bacilli in the pharynx of patients showing no constitutional disturbances is a common thing, and it is by no means rare to find extensive diphtheritic membranes with diphtheria bacilli in the throats of patients entirely free from constitutional disturbances. No one would for a moment fail to call such cases true diphtheria and the same line of thought must make one call a fibrinous

¹ Berliner klin. Wochenschrift, 1905, p. 969.

² Deutsche med. Wochenschrift, 1905, p. 65.

rhinitis with diphtheria bacilli a diphtheria irrespective of the severity of the general symptoms.

That cases of this type may cause the ordinary picture of diphtheria in other children is shown by the fact that two sisters of one of his cases shortly after developed pharyngeal diphtheria. That the fibrinous rhinitis is dangerous to the patient himself is shown by such cases as that of Lublinski, in which a severe pharyngeal and laryngeal diphtheria followed recovery from a mild fibrinous rhinitis.

One must agree with Wolff that cases of rhinitis fibrinosa in which diphtheria bacilli are demonstrated must be regarded as true diphtheria, no matter whether constitutional symptoms are present or not, and that they must be treated with serum and isolated just exactly as other cases of the same disease are.

Dysentery. This disease has been rather extensively discussed, particularly in its relation to the summer diarrhoea of children and as to the relation between the sporadic and epidemic form of the disease. It may be said that so far as investigation has gone a not inconsiderable proportion of the cases of summer diarrhoea are really due to some one of the forms of dysentery bacilli, and that, as was noted last year, the only methods by which these cases can be recognized are bacterial and not available in the run of practice.

It seems probable from recent articles that the Flexner bacillus causes a clinical picture quite different from that of the Shiga organism, and effort will be made to point out these differences.

During the year there has been no extensive article upon the use of the antidysenteric serum, and opinion upon the value of this therapeutical agent must be reserved. Much of the work of the year upon dysentery has been devoted to questions of agglutinins, aggressins, and the like, work which will no doubt bear abundant fruit but which has not as yet done so.

Wimie¹ publishes a report upon the *agglutinating power of the blood serum of children with summer diarrhoea upon the Shiga bacillus*. Of 40 cases in which this organism was found in the stools 25 (62.5 per cent.) gave a positive reaction and 14 a negative one, and in 1 the reaction was not tried until the patient's second admission, when it was positive. Of the negative cases 4 were of less than one week's duration, and one of these reacted later even to 1:1000; 1:50, and one during convalescence in dilution of 1:20. Of the other 7, 1 died on the ninth day and the other 6 were cases of short duration. These details are given to show that the failure of the reaction in so high a percentage of the cases is not so significant as might at first appear. Of 42 cases of dys-

¹ Johns Hopkins Hospital Bulletin, 1905, p. 93.

peptic diarrhoea in which the stools were not examined bacteriologically 14 cases gave positive reaction.

The earliest appearance of the reaction was the second day. The persistence of the reaction varied, in some cases persisting as long as thirty-nine days. The degree of dilution varies, but in 22 cases the reaction was present even in 1 : 1000, in 13 cases only up to 1 : 100. There is no relation between the severity of the disease and the intensity of the reaction.

Jehle and Charleton¹ publish from the Escherich Clinic a study upon the *epidemic and sporadic dysentery in childhood*. They divide their cases into three groups:

I. Cases seen in a small epidemic in Vienna, all due to the Shiga-Kruse bacillus.

II. Sporadic cases, all due to the Flexner type of dysentery bacillus.

III. Cases which showed no clinical evidences of a dysentery.

In regard to the etiology of these cases they state that the epidemic dysentery is due mainly to infection by contact with dysenteric discharges. Food or water may carry the infection. Persons only slightly sick and those who without showing symptoms still have the bacilli in their stools play an important part in the spread of dysentery.

Sporadic dysentery may be excited by certain foods without there being any reason to believe that the food was contaminated with the special bacterium. In all such cases the organism proved to be the Flexner bacillus. The duration of the incubation period cannot be determined in most cases, but in some cases at least is as short as fifteen to twenty hours. In a personal experiment the first symptoms appeared seventy-two hours after taking the culture.

Without going into a detailed description of the clinical picture it may be said that the onset with the Flexner bacillus infection is usually more sudden and severe than with the Shiga-Kruse organism, but the condition improves more rapidly. The course of the temperature in the two groups is very different. With a Shiga-Kruse infection the temperature is usually remittent or intermittent, of moderate intensity and more prolonged, while with the Flexner infection there is a rapid rise, 104°-105.8° F., and even after twenty-four hours the temperature may fall to normal with sweating. The results of their study of the serum reactions is as follows:

The serum reaction appears in the course of the first week usually, but it may be delayed to later or may even fail to appear at all. The serum of a patient infected with the Shiga-Kruse organism agglutinates this bacillus and not the Flexner, and *vice versa*. Sometimes mixed

¹ Zeitschrift f. Heilkunde, 1905, Bd. xxvi. p. 402.

infections occur, in which case both forms of bacilli are agglutinated. The reaction is usually distinct in dilutions of 1:40 to 1:80, less often in 1:160. The prognosis in cases due to the Shiga-Kruse bacillus is much worse than in cases due to the Flexner type.

These authors failed to find dysentery bacilli in the few cases of diarrhoea which did not present the clinical appearance of dysentery.

Katharine Collins¹ examined the stools of 21 cases of acute and sub-acute diarrhoea in children, and while the symptoms were severe and the mortality high, she failed to find the dysentery bacillus in any case.

Doerr² has had an opportunity to study epidemics of dysentery in Krakau and in Vienna. In the former place the dysentery was due to the Shiga and in the latter to the Flexner organism. From his description of the cases due to the Flexner bacillus it is obvious that this type of cases is much milder than the Shiga type, as pointed out by Jehle and Charleton. After a short prodromal period, during which the patient complains of depression and slight abdominal pain, there is a sudden rise in temperature with a diarrhoea, which at first is watery but soon becomes slimy and bloody. The tenesmus becomes severe and there is great pain and tenderness, especially over the descending colon and the sigmoid flexure. The temperature usually begins to fall after twenty-four hours and is again normal by the third or fourth day. The diarrhoea does not stop as soon as the temperature falls but continues for a few days longer. During the first days the pulse and temperature correspond, but later about one-third of the cases show a marked bradycardia, even down to forty-eight beats per minute. This is converted by slight exertion to a tachycardia of 120 to 132. Complications were uncommon. The serum reaction in the two groups of cases described by Doerr was strikingly specific; the serum of the Vienna cases agglutinating the Flexner bacillus in dilutions up to 1:400; the serum of the Krakau cases agglutinating the Shiga organism in the same dilutions.

Dopter,³ in the course of experimental work upon rabbits with the *toxins of dysentery*, has noted paralytic phenomena coming on generally about three days after inoculations. Clinically it is oftenest a paraplegia of the hind legs. This may remain localized, but usually it takes a rapid ascending course, involving the anterior extremities and the bulbar region. Rarely it begins in the front legs and descends to the hind legs. Less often it is in the nature of a hemiplegia. The paralysis is motor, not sensory, and muscular atrophy is the rule. Microscopic examination of the nervous system shows that the symptoms are due to changes in the cord.

¹ Journal of Infectious Diseases, November, 1905.

² Centralblatt f. Bakteriologie, Bd. xxxviii. p. 420.

³ Comp.-rend. d. soc. d. biologie, Paris, 1903, p. 400.

The experiments have a clinical bearing because of the paralysis seen in man after dysentery. Some say that this is not a rare happening. It has been thought that the symptoms were due to a neuritis, but this work of Dopter would suggest that the pathological changes are central rather than peripheral. The paralysis in man is usually paraplegic.

Epidemic Meningitis. This disease has received much attention during the past year because of its prevalence in many parts of the world, notably in New York City. The points which have received particular discussion are the bacteriology, the infection aetiology, the contagiousness, the diagnosis, and the treatment. Very briefly summarized it may be said that the epidemic form of meningitis is due to the diplococcus intracellularis of Weichselbaum, but that the identification of this organism is so difficult that only the most expert can make it. It resembles closely the micrococcus catarrhalis, the pneumococcus, and as Weichselbaum and Ghon say, a number of other micrococci and diplococci.

The mode of entrance of the infection seems to be the nose and throat and the articles upon this aspect of the disease will be reviewed at some length. Upon the question of the contagiousness of the disease there is some difference of opinion, but the trend is toward disbelief. Treatment has been discussed by various authors and all manner of propositions have been made, the very number of them showing clearly their value.

Schottmüller¹ very carefully considers the subject of epidemic meningitis, discussing first whether epidemics of meningitis ever result from infection with any other organism than the meningococcus. He notes the epidemics of meningitis recorded by Bonome and by Parrienski, and believes that in both the causal organisms was the streptococcus mucosus. Speaking of the pneumococcus he says he does not know of any epidemic which has been proven to be due to this organism, although he is familiar with and in accord with Marchal's statement that 42.1 per cent. of the sporadic cases of meningitis are due to the Fraenkel-Weichselbaum diplococcus.

CEREBROSPINAL FLUID IN MENINGITIS. Schottmüller makes one statement in regard to pneumococcus meningitis with which one cannot agree. He says that it ends invariably in death. This is certainly not true, as I can affirm from repeated clinical experience.

In considering the cerebrospinal fluid he brings out some points of interest which, while not new, are worth quoting. The fluid may be perfectly clear and from this may range through all grades to very cloudy, purulent fluid. Microscopically one finds the polymorphonuclear leu-

¹ Münchener med. Wochenschrift, 1905, p. 1617.

kocytes with none or very few lymphocytes. This rule, however, is liable to some exceptions, and one may find mainly lymphocytes with this form of meningitis as they may find only leukocytes with the tuberculous meningitis. The appearance of the fluid may change from day to day. One day purulent, the next day clear, or the reverse. Even on the first day of the disease the fluid may be quite cloudy.

The micro-organisms are not usually so numerous in this as in the pneumococcus infections. It is striking also that there is no relation between the number of cocci and the number of cells in the cerebro-spinal fluid. A clear fluid may show many of the cocci, while a cloudy fluid may show very few. Moreover, there is no invariable relation between the number of the organisms and the severity of the clinical picture. The cocci are, as a rule, present as long as the fever continues. They may be found as early as the second day and may persist for weeks and months. In making the cultures from the fluid large amounts must be used, although one sometimes may get them from a single cubic centimetre.

The micrococcus of Weichselbaum fortunately has a very low resisting power, a fact which has an important epidemiological bearing. It is very sensitive to drying and is an obligate parasite, usually transferred directly from man to man, settling first in the nose. Kiefers has shown that this organism can excite a rhinitis, and, as will be pointed out, has been found in the nose of those sick with meningitis or in contact with such by Lingelsheim, Westenhopper, and others.

Lenhartz¹ reports his personal experience with epidemic meningitis covering 45 cases, in 40 of which he believes that the disease was the result of the Weichselbaum diplococcus, which in all but 1 case was demonstrated during life. The other 5 cases were seen under circumstances which prevented the lumbar puncture. In 3 cases suppuration occurred in joints, and in the pus in each case the meningococcus was found in pure cultures. In 2 cases the same organism was found in the circulating blood.

In general the disease was long continued, lasting several weeks to several months, although in 8 of the 12 fatal cases the duration was from two and a half to six days. Lenhartz points out that the cases of meningitis due to the pneumococcus were of much shorter duration, none of the 5 cases which he lists lasting more than five days.

The mortality of the 40 bacteriologically confirmed cases was 55 per cent. In 9 cases in which leukocyte counts are recorded the number varies from 10,000 to 65,000, and there seems to be no material difference in the counts shown by the cases ending fatally and by those which recover.

¹ Deutsches Archiv f. klin. Medizin, p. 84.

Lenhartz is convinced that regularly repeated lumbar punctures are of benefit and advises withdrawing from 25 to 40 c.c. of fluid at each sitting. The largest number of punctures made was fifteen, withdrawing 400 c.c. of fluid; the third to the thirteenth puncture was desired by the patient because only in this way was relief obtained.

Martini and Rohde¹ report a case of epidemic meningitis which should be noted because of the fact that the meningococcus was found not only in the cerebrospinal fluid but also in the circulating blood. Instances of septicæmia in this disease are sufficiently exceptional to warrant recording all demonstrated cases.

Professor von Lingelsheim² makes a report upon a bacteriological study of an epidemic of cerebrospinal meningitis based upon the examination of the fluid obtained by 243 spinal punctures; 138 of the cases showed the meningococcus intracellularis 3 times microscopically only, 25 times by culture only, and 135 times by both methods. The cultures were pure in 76 cases and mixed with other bacteria, mainly the staphylococcus and a Gram-positive diplococcus in 62 cases. The punctures were made upon the following days: 15 upon the first day of the disease, 43 on the second to fifth day, 14 on the sixth to tenth day, 7 on the eleventh to twentieth day, and 6 after the twentieth day. In 53 cases the duration of the illness could not be determined. In 89 cases the spinal fluid failed to show the meningococcus. Of these 21 yielded no bacteria, the others bacteria of various sorts, mainly the staphylococcus and a Gram-staining diplococcus.

The blood of 9 of the negative cases showed a marked agglutinating action in dilutions of 1:25 and 1:50 upon the meningococcus. Post-mortem material from 139 cases was examined, partly spinal fluid, partly ventricular fluid, and partly brain tissue. The meningococcus, usually in pure cultures, was found in 68 cases. Of the other 71 cases 41 must be excluded either because of the great number of putrefactive bacteria or because the autopsy was made more than two days after death.

One of the most interesting and in some ways the most important part of this work is the report upon the agglutinating power of the blood serum upon the meningococcus. A culture obtained by puncture was used for this purpose, at first living and later killed by 1:1000 formalin. After it had been found that no agglutination of this culture was caused by a dilution of 1:10 of the serum of normal individuals and those sick with various diseases, this dilution was adopted as the standard; 420 examinations were made and 146 of these were positive and in the

¹ Berliner klin. Wochenschrift, 1905, p. 997.

² Deutsche med. Wochenschrift, 1905, p. 1017

following dilutions: 146 with dilution 1:10; 86, 1:25; 30, 1:50; 8, 1:100; 1, 1:200. The date of the appearance of the agglutinating power was not constant, in some cases as early as the first day, in others as late as one or two weeks. In general the power disappeared rather rapidly, but in some cases returned and in greater power.

Hastings,¹ in an article upon the cellular and bacterial content of the spinal fluid in 50 cases of meningitis, includes the report of 42 cases due to the meningococcus.

The amount of fluid withdrawn in these cases ranged from 1 to 20 c.c. The fluid in all was turbid, varying from a slight flocculent, translucent cloudiness to purulent opaqueness. In none of them did a coagulum separate. The fluid was blood tinged in only 8 cases. The number of cells varied greatly, but the differential count of the whites showed a proportion of 68 to 100 per cent. of polynuclears. In 5 cases due to the pneumococcus the leukocytes ranged from 94 to 99 per cent., while in 5 due to the tubercle bacillus the lymphocytes, small mononuclear cells, amounted to from 68 to 100 per cent.

CHANGES PRODUCED BY THE MENINGOCOCCUS. Another question of some importance is whether this micrococcus can cause changes in other organs than the meninges.

Weichselbaum and Ghon² discuss at considerable length this possibility. After a careful review of the literature, in which they exclude many cases because the diagnosis was made upon microscopic examination only, they conclude that there are a very few cases in which other organs have been infected by this bacterium and list among these rhinitis, tonsillitis, pleuritis, pericarditis, and possibly arthritis. To this list they add a case of acute endocarditis developing in the course of a cerebrospinal meningitis and due solely to the meningococcus. Efforts directed to the discovery of this organism resulted in showing a small percentage of cases in which the meningococcus was probably present in the nose and throat of patients ill of meningitis and a still smaller number in which they certainly were present. They were demonstrated with certainty in the nasal secretions of a few people not sick with meningitis, but caring for them. These authors point out very clearly the great difficulties which stand in the way of identifying the meningococcus and especially accent its close resemblance to the micrococcus catarrhalis. There are also a number of other micrococci and diplococci which closely resemble it.

SOURCE OF INFECTION IN MENINGITIS. Lingelsheim³ believes, as others have and do, that the infection atrium in this disease is the nose

¹ Medical News, 1905, p. 1110.

² Wiener klin. Wochenschrift, 1905, p. 625.

³ Loc. cit.

or pharynx, and for this reason he instituted a study of cultures taken from these parts covering in all 1500 examinations from 635 sick and 289 healthy persons. He found a coccus which he believed to be the meningococcus in 146 of the 635 sick. The coccus was not found in all who were sick, and he thinks this is explained by certain facts. The coccus is sensitive to injurious influences, particularly to drying, and in many cases there was an interval of twenty-four hours between the taking of the swab from the throat and the inoculation of the culture media. Moreover, his experience leads him to believe that the coccus is not spread over the fauces and tonsils but is concentrated in the post-nasal space and the back parts of the nose. The best way to make the culture is to pass the swab back through the nose to the posterior wall of the pharynx and then to promptly inoculate the culture media. Moreover the cultures are more apt to be positive in the early days of the disease. In 68 instances in which all these conditions were fulfilled the results were all positive. In 289 examinations of healthy people, mostly relatives of patients, positive results were obtained in 26. Fifty-six school children were examined with 4 positive results, 3 of them in children from houses or neighborhoods in which the epidemic meningitis had occurred.

Westenhoeffer,¹ working under the general direction of Professor von Lingelsheim, whose article upon epidemic meningitis has been already quoted, reports the results of his study of thirty autopsies upon patients dying of epidemic meningitis. Three points were kept particularly in mind in this work: first, to ascertain the infection atrium; second, to learn the way in which the infection reached the brain, and lastly, to note the other changes which might be observed. From these three points it was hoped that something practical in the way of therapeutics and prophylaxis might be learned. Those who are especially interested in this matter are referred to the original for many interesting and important details, but for this purpose it is sufficient to quote the conclusions, which are the following:

1. The infection atrium of the organism causing meningitis is the posterior nasal space, and particularly the pharyngeal tonsil.
2. The meningeal inflammation always begins at the base of the brain in the region of the hypophysis. It develops through the lymph channels.
3. The meningeal inflammation as a sign of disease of the cavum cranii is analogous to the disease of the mucous membrane of the accessory sinuses of the posterior nasal space.
4. The meningeal inflammation never or at least rarely develops by extension from a disease of the ethmoidal cells.

¹ Berliner klin. Wochenschrift, 1905, p. 737.

5. The disease is distinctly a disease of childhood.
6. Both children and adults affected by the disease show distinct signs of the so-called lymphatic constitution.
7. The disease is an inhalation disease.
8. Its control is essentially a question of household hygiene.
9. The meningococcus of Weichselbaum is found in the majority of cases, but absolute proof that it is the only cause of epidemic meningitis is not yet at hand. The fact that other cocci, partly alone and partly in association with the meningococcus, can be found, does not exclude the possibility that all these organisms play but a secondary role and that the actual exciting organism is not yet known (analogous to the streptococcus infection in scarlet fever).

To this last conclusion Schottmüller takes strong exception and points out that during ten years he has studied 49 cases of epidemic meningitis, and that all the strains of meningococci, although obtained from cases widely separated in time, have always shown the same cultural and morphological characteristics.

The question of the *contagiousness of epidemic meningitis* is taken up in articles by Abbott and by Kirchner, both bringing out the fact that the disease is only slightly contagious. A consideration of the biological characteristics of the organism, as already pointed out, would suggest strongly that this element of the disease is important, in spite of the slight clinical evidence to that effect.

In this connection mention may be made of some experiments by Maragliano,¹ who caused rabbits to inhale virulent cultures of the meningococci, with the result that two of the animals developed a typical meningitis.

Concerning the importance of the nose, nasal spaces, and the pharyngeal tonsils in furnishing an infection atrium, Grawitz² states that Jansen in all cases has found these organs perfectly intact, especially the pharyngeal tonsil. Grawitz² tells of a recent interesting experience with what might at first appear to be an epidemic of meningitis. During a very few weeks 17 cases were admitted as meningitis, 3 of them proved to be examples of intestinal intoxication; 4 were meningitis secondary to various processes; of the other 10 no less than 7 were tuberculous. Three were sporadic cases of meningitis, 1 due to the streptococcus, and 2 to the diplococcus of Weichselbaum.

A. C. Abbott,³ Chief of the Bureau of Health in Philadelphia, publishes a short note upon epidemic cerebrospinal meningitis as seen in that city between September, 1904, and April, 1905. During this period

¹ Gazzetta Ospedali et Cliniche, 1905, No. 19.

² Berliner klin. Wochenschrift, 1905, p. 756.

³ University of Pennsylvania Medical Bulletin 1905, p. 77

52 cases were reported with 17 deaths. In 32 instances sufficient clinical history could be secured and showed that 5 of the cases were tuberculous meningitis, 2 were proven at autopsy to be due to the pneumococcus, and the histories of 6 others made it impossible to classify them as true epidemic meningitis. This shows a range of 40 per cent. of error in the diagnosis and points to the well-known fact that the diagnosis of this disease is not so easy as one might think when standing at the bedside of a typical and well-developed case.

A map of the city showing the location of each case and the order in which they occur is interesting because of its bearing upon the still mooted question of the contagiousness of this disease. From this chart it will be seen that the first case occurred in the Twenty-fifth ward, the second miles away in the Thirty-fourth. This is generally true throughout the whole series, but in a few instances succeeding cases were reported from the same ward, thus the thirteenth and fourteenth cases both came from the same small ward, the Third.

In only four instances has more than one case been reported from a single house. In two houses there is a possibility of there having been direct transmission from one person to another. The disease has been treated as a contagious disease, the houses have been placarded, and the cases have been isolated.

This isolation of the patients seems the safer thing to do, even though the evidence of the contagiousness of the epidemic meningitis is not convincing. Isolation certainly does the patient no harm and while we are still in doubt upon the contagiousness, it is wise to make our errors upon the safe side.

Kirchner¹ presents a very interesting study of the epidemic of meningitis as observed in Prussia. In the first place he objects to the term epidemic as universally applied to this disease because the great majority of the cases occur sporadically. Everywhere throughout the world and all the time isolated cases occur. For example, the average number of cases per year in Prussia, where for years the disease has been carefully recorded by the public health authorities, is but 120 to 140 cases, a number so small that it may almost be neglected.

In certain years, however, the cases so increase in frequency that the use of the word epidemic is justifiable. There have been numerous epidemics but none more widespread or severe than the current epidemic. The point from which the present epidemic spread is unknown.

There is much in Kirchner's article which has an interest only for those working in the territory covered by the report and such material

¹ Berliner klin. Wochenschrift, 1905, p. 708.

is omitted. Certain points of general interest must, however, be dwelt upon.

One fact of importance is that the present epidemic has spread rather slowly and has affected relatively few people, considering the density of the population of the territory covered. The slowness of the diffusion can be accounted for only on the basis of spreading by contact.

The relative smallness of the number of cases is shown by a table which covers a population of 1,868,146 people, among whom there were 1743 cases—*i. e.*, 0.09 per cent. The highest percentage was in Königsbütte, where it reached 0.62 per cent. The lowest was in Neisse and in Leobschütz, where it was but 0.001 per cent.

The distribution according to the age of the patient is clearly shown by figures quoted from Dr. Flatten in Oppeln. Of 2037 cases in which the age is known, 157 were under one year, 231 between one and two years, 212 between two and three years, 217 between three and four years, 171 between four and five years; that is, 48.5 per cent. of the cases were under five years of age; 31 per cent. of the total number of cases were between five and ten years, and 10.9 per cent. between ten and fifteen years. In other words, 90.5 per cent. of the cases occurred in children under fifteen years of age.

The next question which Kirchner asks is whether or not the disease is contagious. The importance of this question is obvious and on the answer must depend the adoption or omission of quarantine of the cases. The figures quoted above show clearly that if it is contagious at all it must be very slightly so, for otherwise it would involve more than one out of every thousand of the people.

One thing pointed out and having a bearing upon this question is that houses in which case after case occurs are extremely rare, while in other contagious diseases they are common. Instances in which several members of the same family are affected with the meningitis are rare, and most of these upon investigation show that the different members were taken sick at about the same time, leading to the inference that they were all infected at the same time rather than by each other. Kirchner mentions one family in which the mother and four children were infected and all but one child died. From all this Kirchner concludes that there is not evidence to warrant placing this disease among the group of contagious diseases.

EYE DISTURBANCES IN MENINGITIS. Heine¹ reports a study of the eye disturbances in epidemic meningitis based upon a study of 100 cases. Disturbances may appear in the motor apparatus, the sensory tracts, or the nutrient portion of the eye. One should not include here the cases

¹ Berliner klin. Wochenschrift, 1905, p. 772.

of conjunctivitis, keratitis, and the like which sometimes develop in the course of this as in other severe infections when the patients lie unconscious, with half-open eyes, for a long time.

Hemorrhages into the retina are seen but much less often than simple intraocular optic neuritis. This is most often due to a descending neuritis from the basal meningitis. Sometimes there is a neuritis of the optic nerves behind the bulbs and without ophthalmological findings unless optic atrophy results. The frequency of secondary optic atrophy is not yet determined for want of sufficient statistics.

Metastatic ophthalmia is seen and is usually severe.

Involvement of the motor oculi nerves also occurs. They are almost always basilar in origin, more often unilateral than bilateral, and oftenest the abducens paralysis. Not rarely one sees a more or less complete paralysis of all the eye muscles. Ptosis is strikingly often absent. The milder cases often recover completely.

Of the 100 cases examined by Heine, 20 showed eye symptoms which totaled 30 in number. There were 9 cases of unilateral or bilateral optic neuritis or retinitis, 13 with motor oculi paralysis, and 5 with ophthalmia.

DIAGNOSIS OF SPORADIC AND TUBERCULOUS MENINGITIS. Grawitz, in an article elsewhere referred to, speaks of the great difficulty in differentiating sporadic cases of meningitis from the tuberculous meningitis. The clinical findings may be identical. The tuberculous cases may present far more severe symptoms than the cases due to the meningococcus. The lumbar puncture is of the very greatest value in determining the nature of the infection, furnishing material for bacteriological study as well as for the study of the character of the exudate. Grawitz finds that in tuberculous meningitis the cells in the spinal fluid are mainly lymphocytes, while they are mainly polynuclear cells in the epidemic cases. Grawitz says in regard to the blood that the sporadic meningitis is usually without leukocytosis, while the tuberculous form usually shows a polymorphonuclear leukocytosis. This is at variance with general experience and simply furnishes another instance of the fact that one cannot draw too definite conclusions from blood counts and from the cellular content of fluids.

Curshman¹ points to the significances of *herpes* as an aid in the differentiation of tuberculous and epidemic meningitis. This eruption was observed by him in 66 per cent. of the epidemic cases.

THE TREATMENT OF THE EPIDEMIC MENINGITIS has thus far been extremely unsatisfactory, and the experience and experiments during the epidemic of the last year has not changed matters materially. All

¹ Münchener med. Wochenschrift, 1905, p. 1176.

the older methods have been repeatedly employed without results. The newer methods which have been tried have been based either upon the direct injection of antiseptic solutions into the spinal canal or upon a reported antagonism between the diphtheria antitoxin and the meningococcus. The former of these has in Franca's hand yielded some results apparently, but one cannot but question the possibility of any active antiseptics being carried out in the spinal canal. Results from a number of observers can alone satisfy this question.

Some who have been using the antitoxin of diphtheria in these cases are convinced of its value, but others with wider experience see no effects.

Waitzfelder¹ reports his experience with the treatment of the epidemic meningitis by the *diphtheria antitoxin*. He was led to do this because of a personal communication from Dr. A. J. Wolff, of Hartford, Conn., who found a pronounced antagonism between the Klebs-Loeffler bacillus and the meningococcus, and that pure cultures of the latter organism were killed by the antidiphtheritic serum. Waitzfelder treated in all 17 cases: of these 5 recovered completely, 3 died, and 9 were still under treatment at the time of the report. Of the latter, 5 gave every promise of recovery, while the other 4 were still in serious condition. The dosage was 6000 to 10,000 repeated every other day.

Peabody,² together with Jacobi, has employed diphtheria antitoxin in the treatment of epidemic meningitis in 22 cases in the Roosevelt Hospital in New York. In all but 1 of these cases the diagnosis was proved by finding the meningococcus in the spinal fluid. Many of the cases came under treatment early in the disease, 16 of them being injected on or before the fourth day. In each case fluid was removed by tapping, between 2 drachms and 1 ounce being generally withdrawn.

Four of the cases received the antitoxin only subcutaneously, the other received it wholly or in part in the spinal canal and in doses ranging from 1200 to 15,000 units.

Of the 22 cases 11 died; of the 11 living at the time of the report 2 are well, 2 are fully convalescent, and 5 are still under treatment, and of these 2 are practically moribund.

The cases, as Peabody points out, are too few to warrant final conclusion, but in watching the cases neither he nor Jacobi could ascribe any influence, either good or bad, to the injections.

Draper in discussing this paper states that 10 cases had been treated in the first medical division of Bellevue Hospital by the subcutaneous use of diphtheria antitoxin with seven deaths, and his conclusions corresponded with those of Peabody and Jacobi. Kinnicutt stated that he had

¹ Medical Record, 1905, vol. i. p. 361.

² Ibid., p. 735.

treated 10 cases in this way with 6 deaths. Loomis stated that after experimenting with the remedy in 8 cases, using 6000 to 10,000 units, it was abandoned. In no case was there any improvement which could be traced to the antitoxin.

Franca¹ makes a brief report upon his experience with an epidemic of meningitis at Lisbon treated by the *lumbar puncture and injections of antiseptic solutions*. In all 114 cases were treated by him. Forty-seven cases were treated by puncture and irrigation with normal salt solution, and of these 30 died; 16 of the cases were purulent meningitis, and of these 12 died; 58 cases were treated by puncture and subsequent injection of 1 per cent. lysol solution, and in this series 17—i. e., 29.3 per cent.—died. The cases of this epidemic were all severe, and no case is included in the report in which the diagnosis was not confirmed by bacteriological methods; 3 to 9 c.c. of the lysol solution were given to children and 12 to 18 c.c. to adults. The injection was sometimes somewhat painful, but the pain rapidly disappeared. A few cases of tuberculous meningitis were treated in this way but with negative results.

Hogner² suggests the *intravenous or intramuscular use of mercuric chloride* and reports two apparently hopeless cases treated in this way.

Barth and Manhan treated a case with intraspinal injections of colargol, using 1 cm. of a 1 per cent. solution, making in all and at various intervals four injections. The case was prolonged over two months but ended in recovery. The diagnosis of the nature of the meningitis was based upon bacteriological examination of the spinal fluid.

Influenza. While this disease has not been conspicuous for some time, it is with us to some extent always and may easily become endemic. Presslich³ has recently published a report of a carefully observed endemic in Vienna covering 154 cases. He points out among other things that, while influenza in its pandemics appears to cause few deaths, it is apt to present itself in much severer shape in local epidemics. In the endemic he observed the mortality was 3.9 per cent., a contrast to the death rate of scarcely 1 per 1000 in 1890. It must be noted, however, that most of the deaths in Presslich's cases were due to a tuberculosis which had been whipped into activity by the intercurrent influenza. In the endemics as in the pandemics this is the greatest danger. Another point of contrast between these cases and those seen during the pandemics is their more prolonged course. The average duration was 32.7 days, while in 1889 and 1890 the average was from four to six days.

¹ Deutsche med. Wochenschrift, 1905, p. 789.

² American Medicine, 1905, vol. x. p. 285.

³ Wiener med. Wochenschrift, 1905, p. 1701.

Among the serious complications there were 15 cases of pneumonia, 1 ending in gangrene; 16 cases of pleurisy, with 1 ending in empyema; 8 cases of arthritis; 8 cases of endocarditis; 7 cases of tuberculosis, and 5 of otitis media.

In general the clinical picture was typical; some conjunctivitis, severe rhinitis, reddening of the soft palate, troublesome cough, and temperature to 103° or 104°. There was an abundant expectoration of greenish-yellow color, frothy, and containing influenza bacilli. The bronchitis was troublesome, usually lasting one to two weeks, but sometimes continuing in spite of everything for weeks and months, to finally gradually disappear.

The temperature rose suddenly with chill or chilly sensation and then usually returned to normal in one to four days by lysis, but sometimes by crisis. In some cases the temperature continued for days or even for as long a period as four or six weeks.

A very troublesome symptom was the profuse sweating, which often began with the high fever and continued later without holding any relation to the fever. The sweating resembled that seen in acute articular rheumatism.

The pulse, even at the beginning of the disease, was rapid, out of proportion to the fever, and was easily influenced to additional rapidity by the most ordinary causes. The pulse was usually regular at first but later after the temperature had become normal arrhythmia was not uncommon. Almost without exception bradycardia developed; several times the fall in pulse rate was excessive, even running 37 to 40 for days. Presslich thinks this a characteristic of influenza but postinfective bradycardia is common after a number of the infectious diseases, especially pneumonia and typhoid. Another thing noted is the irritability of the heart during convalescence, even sitting up in bed sending the pulse to 140.

Blood examinations were not made in all cases, but many cases examined showed a leukocytosis of 10,000 to 12,000. The neutrophils were especially increased, while the percentage of lymphocytes fell to 10 to 12.

Malaria. **PROPHYLAXIS.** This disease has received perhaps less attention than it should deserve, but our knowledge of it has now reached such a point that it may be expected to receive less and less as the years go by. The most interesting and most important articles of the year have been upon prophylaxis and all are agreed that three things are essential to stamping out malaria: complete cures of all cases of malaria and the protection of the sick from the bite of the anopheles, thus limiting the possibility of these insects becoming carriers of infection; next the destruction of the anopheles and their breeding places, and lastly, the protection of the healthy from the bite of the anopheles. All of these

things are difficult to accomplish, but they can be done. The *Journal of the Royal Army Medical Corps* of October, 1904, contains an article describing Koch's preventive treatment of malaria by quinine. The quinine is given only to those whose blood shows the parasites. Fifteen grains are given daily for two days. If fever occurs or the blood contains large or small annular forms, 30 grains per day for two days and 15 grains per day for three more days were given. The further treatment was 15 grains of quinine for two days, every nine days for tertian and every eight days for quotidian cases, and this continued for a period of three months.

The results obtained by this method have been striking. Thus in Franzfontein, in German South Africa, the blood of 56 per cent. of 279 inhabitants showed parasites in 1901, while in June, 1902, only 6 per cent. of 240 inhabitants showed them. In another settlement, Brioni, after the above method was employed 170 laborers were imported and none of them developed malaria, although previously it was not safe to spend even a single night in the neighborhood. The author considers that mechanical methods of defence, such as mosquito curtains, are practically useless and that only under military supervision do they give even favorable results.

Kermogant,¹ in a review of the subject of the prophylaxis of malaria, says that there are three things essential to the spread of malaria: (1) Patients suffering with the disease; (2) anopheles to suck the blood from those who are sick and subsequently inoculate the blood of healthy individuals with the parasite; (3) stagnant water in which the anopheles may deposit their eggs.

The anopheles, of which only the female bites, flies and bites, with rare exception, only at night. It is found in large cities as well as in small villages, wherever there is water to assure its reproduction. It frequents the houses where it hides in the darkest corners. Its bite is less painful than that of the common culex. It is rather difficult to catch except after it is gorged with blood, when it is sluggish. It does not like artificial light any better than daylight.

Water is indispensable to them, for it is only there that the eggs develop. The water need not, however, be fresh, for the larvæ develop even in water containing 20 and more grams of sodium chloride per litre. The size of the body of water is immaterial, for they can develop in the depression made by the foot of an animal as well as in the largest lake. In the latter they are found only close to the banks. The question of irrigation canals in this connection has become of great importance in certain parts of this country. Such canals are probably not suitable for

¹ Annales d'hygiène publique, 1905, II. 5.

breeding places for the anopheles so long as the water circulates freely and the canals are kept in good repair, but if vegetation is allowed to spring up along the banks enough stagnation of the water will result to furnish the condition necessary for the development of the anopheles larvæ.

The prophylactic measures which must be deducted from the conditions necessary for the development of the anopheles are: (1) Cure all cases of malaria with the idea of destroying all infection foci; (2) destroy the anopheles; (3) protect the healthy from the bite of these insects.

A circular issued by the Board of Public Health and Marine Hospital Service, July 31, 1905, in connection with the yellow-fever epidemic at New Orleans contains such a pointed statement of the methods of destroying the mosquitoes and in such a shape that its quotation seems worth while:

1. Mosquitoes live in the vicinity in which they breed. They do not often fly a long distance.

2. Mosquitoes breed only in water—usually in artificial collections of fresh water.

3. The young mosquito, or wriggler, lives in water at least seven to twelve days.

4. Although wrigglers live in water, they must come frequently to the surface to breathe.

5. Coal oil on the surface of the water prevents the wrigglers from breathing.

6. Destroy the breeding places and you will destroy the mosquitoes.

7. Empty the water from all tubs, buckets, cans, flower-pots, vases, etc., once every forty-eight hours.

8. Fill or drain all pools, ditches, unfilled post-holes and the like.

9. Change regularly every day all water needed in chicken-coops, kennels, etc.

10. Treat with oil all standing water which cannot be screened or drained (one ounce of oil will cover fifteen square feet of surface). The oil does not affect the water for use if the water is drawn from below.

11. Where oil is applied to standing water it must be spread evenly over the surface.

12. Put fine wire netting (eighteen to the square inch) over cisterns, wells, and tanks of water in everyday use.

13. Places in which it is undesirable to put oil, such as watering troughs for stock, lily ponds, and so forth, can be kept free from wrigglers by putting in gold fish or minnows.

14. Clean away all weeds, grasses, and bushes about ditches, ponds, and other possible breeding places, since these afford a hiding place for the mosquitoes.

15. Clean up vacant lots and back yards of all cans, tins, bottles, and rubbish in which water may collect and stagnate.

16. First do away with or treat all places where mosquitoes are known to breed and then begin to work on places where they might breed.

17. Inspect and treat with coal oil gutters, culverts, ditches, man-holes, catch basins, etc., along the roadside. Manholes should be screened.

Smith,¹ during the course of work done upon malaria in the First Reserve Hospital in Manila, found numerous cases (in all 119) which were classified as of the æstivo-autumnal type because they more closely resembled these than other cases. The organism found did not, however, resemble the æstivo-autumnal type. The parasite is described as a small hyaline disk or oval spindle form. The outlines are sharp, they are highly refractive, and in the centre of each is a small, round dot of hæmoglobin. The short diameter varies from one-tenth to one-fifth that of the red blood corpuscle and the long diameter is about twice as great. No amoeboid movements are shown, but the organism moves by revolving on the long or swinging round on the short axis. They stain with great difficulty, and even then it is only the periphery of the parasite which takes the stain slightly. This is true of the numerous stains and modifications used.

Even though kept under the microscope for as long as four days, no developmental changes were observed.

Clinically the cases corresponded closely to the cases of proven pernicious malaria, and they responded to quinine sometimes promptly and sometimes slowly.

One must not be too ready to accept this as an addition to the number of plasmodia. It differs so in its appearance, motion, staining properties, that further study must be given to it and further effort made to exclude the possibility of its being an artefact or vacuole.

MALARIA AND INFECTIVE ENDOCARDITIS. Coleman,² in an interesting article, draws renewed attention to the fact that infective endocarditis may present great similarity in its clinical course to malaria. The paroxysms of chill and temperature may recur at perfect regularity, even at the same hour, and may follow any type, double quotidian, quotidian, tertian, quartan, septan, mixed and irregular types. Moreover, the paroxysms may exactly resemble those of malaria.

The diagnosis in these cases is often difficult, but attention to the examination of the blood and heart will in most cases remove the doubt. Especial attention should be paid to the differential count of the white

¹ American Medicine, 1905, vol. x. p. 607.

² American Journal of the Medical Sciences, 1905, 1, p. 381.

blood cells. In cases of endocarditis there is often a leukocytosis, but even in those which show a leukopenia the polymorphonuclear cells are relatively increased, while in malaria there is a relative lymphocytosis, usually with leukopenia. Bacteria are often present in the blood in the endocardial cases, while the plasmodium is found in cases of malaria.

One could add also that a splenic tumor is more constant in malaria than in the endocarditis, just as hemorrhages in the skin, mucous membranes, and retina are more, much more, common in the latter condition.

MALARIA SIMULATING ACUTE PERITONITIS. An article published by Gillot¹ upon malaria, presenting itself under the picture of acute peritonitis, has attracted my attention because I have personal knowledge of three such cases and have not previously seen anything in print on the subject. The possibility of this error must be kept in mind, particularly by those practising in malarial regions, but also by all others, as is shown by the three cases mentioned above, all of which occurred in Chicago.

Gillot reports three such cases of which the following is the type: A male patient, aged forty-four years, entered the hospital extremely prostrated, persistent vomiting, pinched face, dry tongue, abdomen very painful and greatly distended, pulse 126. The next day there was a bloody stool. The spleen was somewhat enlarged and a few rose spots were found on the abdomen. A diagnosis of perforative peritonitis, developing in the course of an ambulatory typhoid, was made. Examination of the blood showed plasmodia. Following the hypodermic use of a grain and a half of the bichlorhydrate of quinine, the general condition rapidly improved, the temperature became normal and the patient rapidly recovered.

Measles. As has been previously pointed out in these articles, this disease, which is one of the most important of the diseases of childhood, not only because of the immediate mortality, but also because of the favoring influence which it exerts upon the development of tuberculosis, has received almost no study directed toward the discovery of the etiological factor. During the year an article by Hektoen has appeared, and while no causal organism has been found it can be stated that the cause is present in the blood at some period during the eruptive stage and that the cause is not destroyed by being kept for twenty-four hours at 37° C. in ascites broth.

Hektoen,² after a most interesting review of the history and literature of the subject of the inoculation of measles, reports two personal experiments. He starts with the assumption that inasmuch as measles can be

¹ *Semaine médicale* of September 13, 1905.

² *Journal of Infectious Diseases*, 1905, vol. ii. p. 238.

transmitted from a mother to her fetus the infective agent must be in the blood.

The inoculations were made with 4 to 5 c.c. of a mixture of ascites broth and blood drawn from the vein of patients during the eruptive stage of measles. In 1 case on the thirteenth and in the other upon the eleventh day after the inoculation the symptoms of measles appeared and in both instances ran the typical course. No growth was obtained in the mixture used for inoculation, but it, nevertheless, must have contained the infective material.

COMPLICATIONS OF MEASLES. A statistical report from the Children's Hospital in Paris of the cases of measles treated during the year 1904¹ has appeared and contains much information of general interest. The cases numbered 724 and there were 118 deaths—*i. e.*, 16.3 per cent.; 30 of those dying were in their first year, 40 in the second, 30 in the third, 9 in the fourth, and 9 in the following years, thus showing clearly how much more serious this disease is during the first three years of life than later.

The most common complication was *bronchopneumonia*, found in fifty cases and causing thirty-six deaths, a mortality of 72 per cent. in cases of measles plus *bronchopneumonia*. The next most frequent complication was *otitis*, which occurred in ten cases, three of whom died.

Nine cases had a *diarrhæa*, and of these no less than 6 died.

In contrast to this list of cases treated in the hospital reference to a much larger epidemic seen by Dr. Heissler in a number of small German villages may be made. Here the total number of cases reached 2881, which was 24 per cent. of the entire population. The number of deaths was but 35, a percentage of 1.23, and most of these deaths were due to *bronchopneumonia*. One child died from *suppuration in the middle ear* and one of *nephritis*.

The question of the etiology and pathology of *bronchopneumonia* as a complication of measles has been studied by C. F. Craig,² utilizing material from ten autopsies. In an epidemic of 89 cases of measles, 12 developed *bronchopneumonia* with 10 deaths—*i. e.*, 84 per cent. The cases were all in young men between twenty-one and thirty years. In each case the pneumonia began during the decline of the rash and no case lasted more than ten days, most proving fatal within a week. Nine of the cases were accompanied by *empyema* with 500 to 2000 c.c. of pus. The same number showed abscesses in the lungs. Culture from the lungs showed, in all cases, a streptococcus, which in 6 cases was accompanied

¹ Revue des maladies de l'enfance, 1905, tome xxiii. p. 394.

² Journal of the American Medical Association, 1905, vol. i. p. 1187.

by the pneumococcus, once by the proteus vulgaris and three times by staphylococci.

Diarrhœa Occurring in Measles. Gillard¹ has had an opportunity to observe an epidemic of measles in which a very large proportion of the cases took on a gastrointestinal form; 18 of 25 cases were accompanied by bilious diarrhœa, greenish, very offensive stools. This usually appeared on the second or third day of the eruption but was sometimes delayed as late as the tenth day. In some cases it seemed to cause a fall in temperature.

The cases were in general mild, but 8 of them were severe and 4 died; 6 of these 8 severe cases were complicated by bronchopneumonia. The mortality in this group of cases was not so high as the cases previously referred to, among whom 6 of 9 died.

The occurrence of diarrhœa in measles has been noted by many authors but the stress laid upon it by them has varied. Thus, Dieulafoy says that the diarrhœa frequently appears at the moment of eruption and that this intestinal catarrh lasts twenty-four hours, adding, however, that it sometimes becomes a terrible complication. Others, as Comby, say that these complications are very rare.

Gillard points out, and probably correctly, that there are certain epidemics of measles which are characterized by frequent and severe diarrhœa, while at other times this symptom is rare.

The number of stools varies but averages twelve in twenty-four hours. The stools are bilious, often green, sometimes dysenteric, and in all cases extremely fetid. The diarrhœa lasts from two to nineteen days. Vomiting is present in some cases and is without apparent nausea.

PRODROMAL RASHES IN MEASLES. While prodromal rashes in small-pox have long been recognized, the existence of similar rashes in measles is but little known, there being only here and there in literature reference to them. Rolleston² has recently made a study of them and reports that in 70 recent cases of measles they occurred 30 times—*i. e.*, in 42.8 per cent. This is increased to 50 per cent. if one deducts 10 cases which at entrance showed the typical rash of measles.

The age of these 30 cases ranged from one year to nine years and average 3.5 years, showing that the rashes were not mere infantile roseola, such as are seen and usually attributed to dentition or worms.

In 22 cases the prodromal rash appeared on the first day, in 7 on the second day. In 10 cases this rash appeared before catarrhal symptoms; in 18 they appeared together and in 11 the catarrhal symptoms preceded the prodromal rash but became worse in from one to three days.

¹ Lyon med., 1905, tome civ. p. 907.

² British Medical Journal, January, 1905, p. 233.

In 12 out of 24 cases in which Koplik spots were noted the prodromal rash preceded them for a period varying from one-half to five days.

The varieties of rash noted were:

Isolated macules	14
Blotchy erythema	10
Isolated papules	9
Urticaria	9
Scarlatiniform rash	9
Circinate erythema	1

The distribution of these prodromal eruptions is shown in the following table:

Trunk	28
Behind ears	15
Limbs	14
Face	4
Neck	2

The general characteristics of these rashes may be summarized as follows:

1. Early appearance—usually within forty-eight hours—frequently they precede catarrhal symptoms, Koplik spots and occasionally even the temperature.
2. They are transient, but the scarlatiniform rash may last twenty-four hours.
3. They show a tendency to be localized, but the site selected may be anywhere on body or limbs.
4. They are frequently polymorphous.
5. They show no signs of local irritation.
6. They have no prognostic significance.

KOPLIK SPOTS. Bruning,¹ in a report from the children's clinic of the University of Leipsic, makes the following conclusion to his observations upon the Koplik spots in measles. He says: "According to our personal experience, Koplik spots are always found upon careful examination and they are an absolutely pathognomonic early symptom of measles. They deserve the most careful observation because of their diagnostic and prophylactic value, both in private and hospital practice."

Bruning is more enthusiastic than most, more so than my personal experience leads me to be, but his position is worth quoting, as it will tend to lead some to more careful observation.

This article is based upon 100 consecutive cases of measles; 48 entered the hospital with a diagnosis of measles and 19 per cent. of these showed

¹ Deutsche med. Wochenschrift, 1905, p. 384.

the Koplik spots. More valuable for this purpose is the second set of 52 cases which developed in the hospital. In all of these except 2, which developed in a surgical ward, the spots were seen and appeared from one to seven days before the rash. In most cases they disappeared with the appearance of the rash, but in 17 they persisted afterward, and in 2 they did not fade until the measles rash did.

The spots vary greatly in size and number but they are usually few and small. They sometimes appear on the lips and gums, as well as upon the cheeks.

They were not found in any case of German measles, scarlet fever, or serum rash.

MEASLES FOLLOWING SCARLET FEVER. Risel¹ points out the great severity of measles when it follows immediately upon the feet of a scarlet fever. His article is based upon 35 cases of this sort occurring during the last decade in the Leipsic children's clinic.

It is extremely difficult to prevent this combination from occurring and multiplying in a children's hospital because of the impossibility of recognizing the measles early enough to prevent infection of other children. The course of measles under these circumstances is not particularly different from the normal course except that the eruption is apt to be atypical and complications are abnormally frequent and severe. The course of the temperature is not influenced by the preceding scarlet fever. The mortality reaches 20 per cent.

TUBERCULOSIS AND MEASLES. The influence which measles exerts over the development of tuberculosis of the lungs and lymph glands has been long and generally appreciated. That it may exert an equally favoring influence upon the tuberculosis of other organs is not so widely known. Gaucher and Druelle,² after reviewing the literature, in which there are now reports of a considerable number of cases, add 4 cases of cutaneous tuberculosis from their personal experience. Only such cases should be included here in which the tuberculosis develops during or immediately after convalescence from the measles. The cases so far reported are almost all in young children and have this striking feature, the foci are multiple and appear simultaneously in widely separated areas. Another peculiarity is the rapidity with which the lesions evolve during their earlier stages, later their course is chronic.

The cause of this rapid development in multiple foci is no doubt found in the exhaustion resulting from the measles. The same method of development of cutaneous tuberculosis is seen after other acute infections—as smallpox, scarlet fever, whooping-cough.

¹ Jahrbuch f. Kinderheilkunde, Bd. lxii. p. 50.

² Gazette des hôpitaux, 1905, p. 699.

Adamson¹ also reports a case of this sort. A boy, aged five years, showed a dozen spots of lupus distributed on the face, right hand, back, right thigh and left knee.

Among other complications of which no more than mention can be made are *emphysema of the base of the neck*,² *asthenia of the heart*,³ and *noma*.⁴

Pneumonia. STATISTICS. John S. Fulton⁵ discussed at length the important question "Is Pneumonia Increasing?" The great importance of this disease is appreciated by all and the belief that the disease is becoming progressively more and more frequent, while the mortality rate remains about the same, is very generally held by practitioners. It is, therefore, interesting to note that Fulton, after a very extensive review of the mortality reports from the various cities, concludes that the disease is not in fact more common. From 58 to 66 per cent. of the entire population is between the ages of fifteen and sixty. During the last twenty years the mortality from the respiratory diseases commonly returned as pneumonia has decreased for this age group.

Between 6 and 7 per cent. of the population are over sixty years of age, and the mortality among this group has increased approximately 20 per cent. Among those under fifteen years (about one-third of the population) the records show an apparent rise in mortality rate. It must, however, be kept in mind that a very large proportion of deaths in this group classed as pneumonia are not lobar pneumonia but belong to one large and poorly defined group of lobular pneumonias.

Ashton and Landis⁶ report 991 cases of pneumonia observed in the Philadelphia General Hospital during the period from May, 1897, to October, 1904. As they point out many of the experiences in this series of cases cannot be applied to pneumonia as seen under other circumstances, for the bulk of their cases come from among people exhausted by exposure, malnutrition, alcoholism and disease. Many of them also come from the almshouse and are old; 757 of the 991 cases were males, 234 females. Less than 1 per cent. of the cases were under ten years, and over 50 per cent. were in the thirty years between twenty and fifty, and 27 per cent. were between fifty and seventy. The influence of the class of material upon the mortality is shown by the death rate, which averages 53 per cent. and in 1904 reached 60 per cent.

So far as the distribution of the tissue involved is concerned, the figures given are approximately those given in longer series. The right lung

¹ British Journal of Dermatology, 1905, p. 223.

² Journal d. soc. méd. de Lille, 1905, tome ii. p. 272.

³ St. Louis Cour. Med., 1905, pp. 33-86.

⁴ Méd. de los niños, Barcelona, 1905, tome vi. p. 142.

⁵ Journal of the American Medical Association, 1905, 1, p. 102.

⁶ American Journal of the Medical Sciences, January, 1905, p. 952.

alone in 54.1 per cent.; the left alone in 32.6 per cent.; and both lungs in 13.3 per cent.; 104 of the 991 cases were alcoholics, not merely those addicted to the use of alcohol, for a large majority of the cases gave this history, but the subjects of recent acute alcoholic excesses; many of these developed delirium tremens.

Trauma is given as having some influence in the causation in 7 cases, and in 6 of these the pneumonia was on the injured side and in some instances corresponded to the site of the injury.

Onset with a severe chill was noted in 492 cases, but numerous instances of insidious onset were seen; some with headache, malaise, heavy cold, generalized pain and other indefinite complaints which last for days or even weeks before the actual development of the pneumonia.

Considering the character of the material the number of cases beginning insidiously is not large.

Pain, of the peculiar stabbing character, so often seen in pneumonia, was present in 679 cases; cough in 737 cases; blood-tinged and rusty sputum in 537 cases.

Herpes was noted in but 47 cases; that is, in but 4.7 per cent. This as the authors state, is far below the percentages usually given. I was interested to see that statement that in the last 20 cases of pneumonia carefully observed for herpes, they showed in but 3 cases. This is 15 per cent., and is so very far below my personal observations that I think a larger number of cases will raise the percentage to something approximating 90 per cent.

Nephritis was noted in 207 cases, and febrile albuminuria, that is, albumin without casts, in 232 cases.

The latter figure is very low, indeed, and is probably to be accounted for in the same way that many of the other divergencies of this report from average experience are to be explained; namely, by the fact that the histories and records were made by many visiting men and many internes.

Crisis occurred in 264 cases, 152 on the odd days and 112 on the even days. In some cases the crisis was much delayed, even to the twenty-sixth day in one instance.

One case is recorded in which the post-febrile *bradycardia* reached the very low figure of 26.

Respirations reached above 40 in 107 cases, the maximum being 82. This is high, but in a series of nearly 1000 cases I should have expected it to be reached more than once. I have recently seen a case of double pneumonia with thrombosis of the basilar artery in which, shortly before death, the respirations reached 104.

The *leukocytes* were generally found increased in number, ranging from 10,000 to 40,000. The highest was 74,800 and the lowest 4200.

No definite relation between the degree of leukocytosis and the tendency to recover could be elicited. The cases in which there was no leukocytosis or which showed an actual leukopenia, except when the accompanying symptoms were very mild, were usually fatal.

Complications were noted in 53 cases, an astonishingly small number, and some of the common ones, like pericarditis and endocarditis, are not excluded at all. One is also surprised by finding but two instances of myocarditis in 991 persons of this class of society.

The *Journal of Experimental Medicine*¹ contains much of the material worked over by the New York Pneumonia Commission. It is impossible to review with any completeness these articles, but certain results which seem important will be stated.

Pneumococci were isolated from the throats of 50 out of 80 normal individuals; from 66 of 74 cases of pneumonia (lobar and broncho-); from 10 of 15 cases of common colds, and from 14 of 31 cases of miscellaneous diseases.

The virulence of pneumococci from cases of pneumonia is higher than that of those from normal cases; the difference, however, is not great.

Grown on artificial media all of the virulent stains are losing their virulence but not with equal rapidity.

Organisms of the pneumococcus and streptococcus group were present in the lungs of practically all cases, whether normal or showing a variety of lesions; strictly speaking they were found in 40 of 42 cases examined after death. The pneumococci and streptococci were obtained in practically the same proportion—*i. e.*, in 50 per cent. of the cases.

It is to be hoped that this Commission will, when their material is fully worked over, publish some brief report which will cover the essential results of their work and freed from the details, which would prevent the great bulk of the profession from reading the report.

THE STREPTOCOCCUS MUCOSUS A CAUSE OF PNEUMONIA. Schottmuller² adds another organism to the already rather lengthy list which can cause the clinical picture known as croupous pneumonia. To this organism the name of streptococcus mucosus is given. The number of cases so far found is very small but the diagnosis in each seems well founded. The organism grows on solid media as a diplococcus in chains of ten to fourteen members. It has a capsule in all generations and stains by Gram's method.

Clinically the cases do not differ from the common type of croupous pneumonia and the diagnosis must be based upon the blood cultures.

¹ 1905, 7, No. 5.

² Münchener med Wochenschrift, 1905, p 1425

Pathologically, the alveoli and bronchi yield a peculiar, stringy, slimy exudate similar to that seen in cases of pneumonia due to the Friedlander pneumobacillus.

PNEUMOCOCCI IN THE BLOOD. Rosenow,¹ to whose work upon the bacterial content of the blood in pneumonia repeated reference has been made in former articles, reports briefly upon further work. He finds no reason to alter conclusions reached by former work and adds some new facts which are of interest. He finds, for example, that there is an inverse relation between the number of leukocytes and the number of pneumococci in the blood. Thus, in 7 cases in which the leukocytes ranged between 35,000 and 40,000, the number of pneumococci was very small, varying from none to 25 per c.c. of blood. In cases which showed a leukopenia or only moderate leukocytosis, the number ranged from 100 to 1350 per c.c.

The serum of 96 patients was tested to determine the *agglutinating power* over the pneumococci, of which fifty-five different stains were used. Feeble agglutination was obtained as early as the second day. It gradually grew more marked as the crisis approached, after which it gradually decreased. The highest dilution at which agglutination could be obtained was 1 : 50.

The pneumococci were found to grow upon both normal and pneumonic serum, but in the latter a voluminous precipitate was formed associated with the production of a well-marked acid reaction. This latter fact suggested to Rosenow that possibly the constitutional symptoms of pneumonia are due in part to an acid intoxication and he was led to employing considerable doses of bicarbonate of soda in the treatment. The number of cases recorded is insufficient to warrant any conclusions.

FREEZING POINT OF BLOOD AND URINE IN PNEUMONIA. F. E. Schmidt² has been studying the freezing points of blood and urine in pneumonia with a view of determining the relation of such findings to the course of the disease and to learn whether they have any bearing upon the prognosis. The article contains much information upon the history and the methods of *cryoscopy*, but a few quotations from the conclusion are sufficient here.

There is an absolute lowering of the freezing point of the blood in pneumonia and in some way this depends either on the extent of the consolidation or the height of the temperature. The lowering of the freezing point is greater than can be accounted for by the increase in the venosity of the blood. The concentration of the blood, as shown

¹ Journal of the American Medical Association, 1905, 1, p. 871.

² Ibid., 45, p. 894.

by the lowered freezing point, increases as the disease progresses, and when the heart weakens it still further increases. In fatal cases of cardiac weakness the freezing point is extremely low. The lowering of the freezing point is apparently not due to deficient kidney function.

The freezing point of the urine is considerably lowered and the lowering is greater than would be accounted for by mere concentration of the urine. The lowering of the freezing point is not due to chlorides. It persists for several days after the crisis.

RELAPSES IN PNEUMONIA. The fact that a patient who has once had a pneumonia is more liable to a second attack has been established by numerous clinical experiences. In contrast with this is the fact that relapses in this disease are very exceptional. It is, therefore, interesting to note the following report, although the propriety of using the word "relapse" in connection with it may be questioned.

Lépine and Froment¹ report the remarkable instance of a patient who had pneumonia four times in one year. The intervals between the attacks were eight months, three weeks and lastly one month. The physical signs disappeared rapidly. In each attack the temperature fell by lysis, extending over three days and reaching normal the tenth day of the disease. The temperature curves of the four attacks were very similar.

As an example of what may be properly called a relapse, I will refer to a recent personal observation.

I have recently seen a curious *house epidemic of pneumonia* which is recalled by the fact that one of the cases had a relapse pneumonia. The first case in the family was in a child, aged three years, who had a pneumonia of the right lower lobe followed by an *empyema*. While nursing this child the father became ill with a pneumonia of the left lower lobe. This ended with a crisis, but after a couple of days free from fever, a pneumonia of the left upper lobe developed. This was accompanied by a delirium tremens and was followed by an *empyema* and by a suppurative arthritis of the right knee with phlegmon of the thigh. This patient died. When the father became ill, an older brother nursed the child and then became ill with a pneumonia of the left lower lobe followed also by an *empyema*. In a family of four there were three cases of pneumonia, all sick at the same time and each followed by an *empyema*. Instances of house epidemics are not so uncommon, but such an unfortunate combination of circumstances as the above is extremely rare.

Achard and Grenek² also publish an instance of relapse in pneumonia in which the temperature ranged much lower than during the first attack.

¹ Lyon médicale, tome civ., p. 820.

² Bull. et mem. d. l. soc. méd. de Paris, 1903, p. 623.

In both these cases the second pneumonia appeared so shortly after the first that the propriety of using the word relapse may be questioned.

Griffon and Anthony each are stimulated by the above-mentioned articles and report similar cases of relapsing pneumonia.

AFEBRILE PNEUMONIAS, except those seen in people debilitated by age or disease, are decidedly exceptional, but it is possible that more cases similar to the one reported by Gendre really occur than is supposed. This case was in a healthy male, aged twenty-seven years, who had a typical pneumonia of the left lung, with fever ending by crisis. Immediately after the crisis a pneumonia appeared in the right lung and ran its course without any elevation of temperature whatever, but, like the first one, was followed by a critical polyuria. Some years ago I reported an example of this sort in a young girl who had a pneumonia with pneumococcus endocarditis. A few weeks later a pneumonia developed in the right lower lobe and reached complete evolution without any elevation of temperature. At that time it was suggested that the organism, as a whole, had acquired an immunity to the toxins of the pneumococcus while the lung tissue still remained vulnerable to the direct action of the micro-organisms. The explanation of such cases as this cannot be given, but one cannot help speculating upon them even though they have no facts from which to work.

PNEUMONIA IN CHILDREN. Variot,¹ in a clinical lecture, points out the difficulties often encountered in the diagnosis of pneumonia in young children. The temperature, while beginning suddenly, is more frequently grossly remittent in type than continuous. The initial symptoms, often so characteristic in the adult, such as chill, pain in the chest, dyspnoea and rusty sputum, are usually conspicuously absent. Rapid breathing, which is practically always present in the bronchopneumonia, is not a conspicuous nor constant part of the clinical picture of lobar pneumonia in small children. Cough may not appear for two or three days, and expectoration does not occur. The sputum of these little patients can be obtained only when they vomit or the stomach is washed out.

Physical signs, upon which the diagnosis of pneumonia depends, are often obscure and examination is difficult because of the crying and restlessness of the child.

Gastrointestinal symptoms, which suggest either an ordinary gastro-enteritis or a typhoid, are not uncommon, just as cerebral symptoms, suggestive of eclampsia or meningitis, are not rare.

COMPLICATIONS OF PNEUMONIA. The number of articles upon the complications of pneumonia which have appeared during the year is rather smaller than usual and only two will be quoted.

¹ Gazette des hôpitaux, 1905, p. 963.

Chatard¹ reviews the experience in the Johns Hopkins Hospital with *acute pericarditis* as a complication of acute lobar pneumonia. Of 665 patients with pneumonia, 31, or 4.66 per cent., showed an acute pericarditis. The average age of the patients was 32.5 years, but this complication developed much more frequently in people under this age. In 13 cases the right lung was involved, in 5 the left and in 13 both. In 13 cases the pericarditis was diagnosed during life.

The mortality was 93.5 per cent., 29 of the cases dying.

The frequency with which this complication develops is variously stated by different writers and ranges from a minimum of 0.3 per cent., according to Coolidge and Townsend, to the above figure, which is the highest with which I am familiar. Such wide differences in clinical experience can be rather easily explained, but autopsy reports differ almost as much, ranging from 5 to 16 per cent. It is probable that the frequency of pericarditis differs greatly at different times for reasons unknown.

While *neuritis* is not unknown as a sequel of pneumonia the cases are sufficiently exceptional to attract attention when they occur. The neuritis may appear during the active period of the pneumonia but is usually delayed until after the fever has gone and convalescence established. Rouyer² reports a case of *ulnar neuritis* in a young soldier, beginning eight months after a pneumonia of the left lung. The pneumonia was followed by a pleurisy which persisted for several months, but finally ended in December. The following February the neuritis began with tingling in the fourth and fifth fingers of the left hand, with vague pains in the left shoulder. There were no objective disturbances. A claw-hand developed. Although the patient was under observation for months, the paralysis did not disappear.

TREATMENT OF PNEUMONIA. The question of the treatment of pneumonia, the most important question of all, has received little attention and our knowledge has not been particularly increased thereby.

THE TOXIC AGENT OF PNEUMONIA. The following résumé is given by Brem³ of some work upon the influence of the toxic agent of lobar pneumonia:

I. Action of the toxic agent of lobar pneumonia.

1. Phenomena of the mild action bear the features of stimulation of the central nervous system and cardiac muscles.
2. Phenomena of severe intoxication appear to result from intensified stimulation or enfeeblement and exhaustion from overstimulation.

¹ Johns Hopkins Hospital Bulletin, 1905, p. 334.

² Medical Press and Circular, 1905, vol. cxxxi. p. 163.

³ Johns Hopkins Hospital Bulletin, October, 1905,

3. Death occurs from (1) respiratory insufficiency terminating in asphyxiation or in exhaustion of the respiratory centre, or (2) circulatory insufficiency, which leads, presumably, to accumulation of the toxic agent, and which may induce œdema of the lungs or end in exhaustion of the heart muscle.

II. Therapeutics.

1. Elimination of the toxic agent—*internal hydrotherapy*.
2. Amelioration of harmful influences.
 - (a) Fever—*external hydrotherapy*; pain—*ice-bag* and *analgesics*, restlessness, insomnia, delirium—*external hydrotherapy*, *analgesics* and *narcotics*.
 - (b) Respiratory indications.
 - (1) *Heroin* or *morphine* every two hours for a respiratory rate of 36 or greater.
 - (2) *Oxygen* is probably useless and may be harmful.
 - (c) Circulatory indications.
 - (1) Circulatory sedatives probably contraindicated, excepting the *nitrates*, which may be of benefit during early periods of increased cardiac work.
 - (2) *Alcohol* indicated in alcoholic cases; may be of benefit when there is no circulatory insufficiency.
 - (3) Circulatory stimulants contraindicated except members of the *digitalis* series. The indication is low blood pressure associated with one or more of three conditions, namely, respiratory insufficiency, small urinary output, and œdema of lungs.

Doyle¹ recommends the use of *guaiacol carbonate* in the treatment of pneumonia, employing much larger doses than have been heretofore given. He gives 18 to 25 grains every two hours, even every hour when the case is very severe, until the temperature becomes normal. He has never seen any injury result from these massive doses. If the urine gets too dark, it clears on omitting a dose or two.

This suggestion may be compared to the one recently made, to employ the quinine in massive doses. There seems to be no reason for them except the argument that if a little is good, more is better. No doubt the suggestion will be followed by some, but it is not at all likely that any good will come of it.

In view of the injurious effects of guaiacol on the kidneys when given in large doses, one must fear the possibility of a nephritis, especially when one recalls the condition of the kidneys resulting from the pneumonia itself.

Pässler,¹ writing from the medical clinic in Leipsic, upon the *serum therapy* of fibrinous pneumonia, gives a striking example of the provincialism of many German authors. He says that while Lenhartz reports a mortality of 50 per cent. in cases of pneumonia with pneumococci in the blood, the cases treated with the Römer serum showed a mortality of but 15 per cent. He is apparently blissfully ignorant of the fact that the pneumococci are always present in the blood in pneumonia, and that, therefore, one cannot draw any inferences as to the severity of the case from this fact.

Pässler is not enthusiastic over the results he has obtained and does not recommend the serum except in severe cases, especially those showing a pneumococcaemia.

Lindenstein² also makes a brief report upon the use of the Römer pneumococcus serum and while his experience is confined to 4 cases, all of whom were healthy children except a man of thirty years, he concludes by recommending the serum highly. One cannot help but agree more cordially with the statement made earlier in his article that the serum does no harm. The cases reported are such as almost always recover without medication of any sort.

Rheumatism. During the past year there have been a few additions to the literature of the micrococcus rheumaticus and, on the whole, the claims made that this organism is the specific cause of acute articular rheumatism have been strengthened. Attention has been directed by a number to the important but usually neglected question of myocarditis in rheumatism. The third phase of this disease which has received some extensive discussion is that of the intravenous use of the sodium salicylate.

ETIOLOGY OF RHEUMATISM. Beattie³ has been studying the *micrococcus rheumaticus* and his results in the main confirm the findings of Beaton and Walker, whose work was reviewed in the last article in PROGRESSIVE MEDICINE. Beattie has used two strains of organisms, one from the synovial membrane of a girl with acute rheumatism and recovered from the vegetation of an endocarditis in a rabbit. The second was from a culture obtained from Paine.

It is not wise to here enter into any description of the microscopic staining and cultural peculiarities of this coccus, but Beattie was able by intravenous inoculations of animals to cause endocarditis, polyarthrititis and chorea. The polyarthrititis usually developed in about three days after the inoculations. He concludes that this organism is a special organism and that it is the cause of acute articular rheumatism.

¹ Deutsche Archiv. f. klin. Medizin, Bd. lxxxii. p. 360.

² Münchener med. Wochenschrift, 1905, p. 1874.

³ British Medical Journal, 1905, 11, p. 1510.

Poynton and Shaw¹ discuss in a most interesting way the relations of the *staphylococcus aureus* to rheumatic fever. They hold that while many varieties of organisms are capable of causing acute endocarditis, this disease experimentally produced was rare until a certain diplococcus obtained from the valvular vegetations in rheumatic fever was employed. Since that time experimental endocarditis has become common. They do not agree with the inference that because other organisms can cause endocarditis, they are also capable of producing rheumatic fever. They also do not believe that rheumatism is an example of attenuated pyæmia. The *staphylococcus aureus* was selected for this study because it is the organism so frequently found in cases of pyæmia. Attenuated cultures of this organism do not excite the clinical picture of rheumatism while the *micrococcus rheumaticus* does.

Harris² was led by the work of Meyer and Menzer to the idea that possibly *streptococci* from other sources than the throats of rheumatic patients might cause arthritis in animals. He obtains several races of this organism from various sources and was able to produce an arthritis in several rabbits by intravenous injections of the streptococci and regain the organism from the affected joints.

Endocarditis and chorea apparently did not result from the use of the streptococci.

The work quoted above still further strengthens the probability that in the *micrococcus rheumaticus* we have the actual cause of this disease.

Gürich³ discusses anew the question of the *relation of inflammations of the tonsils to acute rheumatism*. During the past four years he has treated 17 cases of acute rheumatism, 12 of which followed immediately after a tonsillitis, and believes that it is especially the follicular form which has relation to rheumatism and that the relapses are due to the chronic course of the tonsillitis. He holds that treatment of the tonsils is of great importance in the treatment of the rheumatism, several cases of which he saw end abruptly after radical treatment of the tonsils. This suggestion is worth carrying in mind and acting upon in appropriate cases.

COMPLICATIONS OF RHEUMATISM. Courtois-Suffit⁴ reports a case of rheumatism which is of interest because of the number of complications, some of them very rare. The complications were *endocarditis*, *hæmaturia*, *parotitis* and *cerebral manifestations*. The case continued for over two months and ended in recovery. The explanation of the hæmaturia is not given, but it occurs to one to think of the possibility of a renal infarct. The parotitis is an extremely rare complication of rheumatism. The

¹ Transactions of the London Pathological Society, vol. lv. p. 126.

² Transactions of the Chicago Pathological Society, 1905, 6, p. 303.

³ Münchener med. Wochenschrift, 1904, p. 2089.

⁴ Gazette des hôpitaux, 1904, p. 1281.

gland was greatly swollen, red and tender, and curiously enough with the onset of the parotitis the joint pains disappeared, to reappear as the swelling of the gland lessened. The cerebral symptoms, consisting of a very active delirium with temperature of 42.4° C., lasted four days and the joint pains behaved as at the time of the parotitis. Lumbar puncture made at this time yielded a normal fluid.

The frequency and importance of the endocardial complications of acute articular rheumatism have been for years fully appreciated, but with this disease, as with most of the acute infections, only insufficient attention has been given to complicating *myocarditis*.

Geipel¹ has made a study of five hearts from rheumatic cases and finds myocardial changes consisting of submiliary nodules in close relation with the adventitia of the small and middle-sized vessels, consisting of accumulations of very large multinuclear cells. Interstitial changes were found, as were also changes in the muscle fibres.

In connection with this purely anatomical study, it is interesting to note a clinical report made by Michel.² The patient was a boy, aged seventeen years, who had had a previous attack of rheumatism at seven years, unaccompanied by cardiac changes. At entrance to the hospital, on the twelfth day of the disease, he presented the ordinary picture of a moderately severe acute rheumatism, except that the pulse was irregular and only 54. There was also a manifest gallop rhythm. No murmurs or thrills. During convalescence the heart became more rapid, but was irregular.

Michel believes that these cardiac symptoms were the result of a myocarditis and are comparable to similar changes seen in the course of other acute infections, especially diphtheria and typhoid. The bradycardia and arrhythmia during convalescence also strengthen this position.

Poynton,³ in the course of a lecture upon *aortic and mitral disease* in rheumatic children, brings out some points of importance. He states that while it is difficult to produce primary aortic endocarditis by experiment, mitral endocarditis and the combined lesions can be easily produced. From a study of experimental heart disease he believes the infection of the aortic valve is often by direct continuity from the mitral, and in these cases the infection is usually a severe one. It is certainly a fact that pure aortic lesions are rare in childhood, although it is going too far to deny their occurrence. Poynton also points out the frequency with which combined aortic and mitral lesions are associated with obliteration of the pericardial sac. He does not believe that any remedies have a direct action in preventing severe cardiac rheumatism

¹ Deutsche Archiv. f. klin. Medizin, 1905, Bd. lxxxv. p. 75.

² Archives générales de médecine, 1905, p. 13.

³ British Medical Journal, 1905, 11, p. 837.

or in arresting its progress. A great deal can, however, be done by rest and drugs which tend to improve the child's strength.

The fact of the frequent association of *obliterative pericarditis* with combined aortic-mitral lesions seems worthy of some comment. Such a combination has a markedly unfavorable effect upon the prognosis because of the more or less extensive injury of the myocardium. The physical signs of obliteration of the pericardium, while sometimes so striking as to demand attention, are in many cases so obscure that they are overlooked unless carefully and particularly sought for. From this must be drawn the rule that, whenever combined aortic and mitral lesions are found, search must be made for evidences of obliterative pericarditis.

TREATMENT OF RHEUMATISM. *The intravenous use of sodium salicylate* in the treatment of acute articular rheumatism was proposed three years ago by Mendel and since then a number of articles have appeared, both pro and con. Mendel used the following solution:

Sodium salicylate	.	.	.	.	.	.	.	.	.	8.0
Caffeine sodium salicylate	.	.	.	.	.	.	.	.	.	2.0
Aq. destil.	.	.	.	.	.	.	.	.	.	50.0

He injected 2 grains in adults and less according to size in children, repeating the injection at intervals ranging from twelve hours to three days according to the severity of the case, using a Lieberg syringe. Mendel at that time had given over three hundred such injections without local or general disturbances, and had had most satisfactory results in all sorts of acute rheumatic affections. In his latest article in the *Münchener medizinische Wochenschrift*, 1905, p. 165, he still further advocates this method of employing the salicylates. He believes after an experience with more than 2000 injections, that with proper technique there is no danger of either local or general harm. The solution used has already been described. The syringe used is a 2 c.c. all-glass syringe. A band is put about the arm well above the elbow (it has been suggested to use the arm band of the Riva-Rocci manometer) and when the veins are distended, because of the pressure of the band, the needle is plunged into the vein and the injection made. That the injections must be made with every attention to surgical cleanliness is too obvious to require statement.

Mendel is so confident of the specific nature of the influence which salicylates given in this way has upon rheumatic affections that he advocates their employment for purposes of differential diagnosis. If the injection has absolutely no effect upon the pain some other than a rheumatic process is at work. He has employed them in the differentiation of tuberculous from chronic rheumatic joints.

Behr¹ has made 100 of these injections and points out that the veins of different people react differently and show a varying tendency to thrombosis. He also points out that these injections require a certain amount of technical skill, and suggests that one do not make their first attempt at intravenous injections with the salicylate solution because when given subcutaneously this solution causes great pain, although causing no discomfort when given intravenously.

Others who have employed this method do not speak so favorably of it, but it may be stated that so far the unfavorable reports have come from those having the least experience. As instances of unfavorable reports those of Winchelmann and Brugsch are quoted.

Winchelmann² has used the same method in a small number of cases, and while he had in some cases good, even brilliant, results he concludes that the method has no advantage over the ordinary method of administering salicylates.

Rubens,³ who has had a wider experience than Winchelmann, reports his cases in order that others may be stimulated to employ the same methods. He does not, however, believe that the course of the disease is shortened by the intravenous injections, only the suffering is more quickly and effectively relieved. Rubens has also used these injections with satisfaction in neuralgia, lumbago, and rheumatic pleurisy.

Brugsch⁴ has found that the salicylic acid appears in the urine within about thirty minutes after an intravenous injection, and the excretion is completed within six to nine hours, while nine to twelve hours are required when the salicylates are given by mouth. If one gives no more than 2 c.c. of the Mendel solution there are no evidences of renal irritation, but 4 c.c. will cause them.

Brugsch has given these injections in but a small number of cases and concludes that this method has no advantage over the methods ordinarily employed.

Scarlet Fever. PROTOZOAN BODIES. In 1904 Mallory described certain protozoan-like bodies found in the skin of four patients dying of scarlet fever and expressed the opinion that these bodies are actually protozoa and have an etiological relation to scarlet fever. He admitted the possibility of their being artefacts or degeneration products, but was led to the above opinion by the fact that he found a very definite series of bodies of characteristic and distinct morphology, corresponding more or less perfectly to the cycle of asexual development of the malarial parasites.

¹ *Manchester med. Wochenschrift*, 1904, p. 1998.

² *Medizinische Klinisch.*, 1905, p. 730.

³ *Deutsche med. Wochenschrift*, 1905, p. 106.

⁴ *Die Therapie der Gegenwart*, 1905, p. 63.

This article naturally attracted much attention, particularly as it seemed to remove the scarlet fever from among the group of bacterial diseases and place it among those due to the action of the protozoa. While the exciting cause of this most important infectious disease is unknown to us, every characteristic of the disease would lead one to believe in its bacterial origin.

An important result of Mallory's work, if it proved to be correct, would be that we must conclude that the protozoan diseases may be contagious. Heretofore all diseases of this class, like malaria, have proven not to be contagious, and, moreover, passage of the organism through some insect, with sexual development in that host, was necessary for the spread of the disease. If scarlet fever is due to a protozoa, protozoal diseases may be contagious and passage through an insect host is not necessary for the evolution of some protozoa.

The same objections may be urged against the protozoa, suggested as the cause of smallpox by Councilman.

Duval later found these same bodies in the serum of rapidly produced blisters on the skin of patients with scarlet fever, and in spite of the theoretical objections raised above expressed the opinion that these bodies are actually the cause of scarlet fever.

Cyrus W. Field¹ has been studying this subject, using the skin from twenty scarlet fever patients, ten scarlet fever autopsies, fourteen measles patients, four measles autopsies, four patients with antitoxin rashes, and five autopsies on diphtheria cases which had had a rash before death.

The skin in scarlet fever and in measles showed bodies similar to those described by Mallory.

Blister fluid was taken from 18 cases of scarlet fever and 14 cases of measles. The bodies of Mallory were found in all the cases of measles and in 14 of the cases of scarlet fever.

Blister fluid was obtained from sixteen patients presenting various forms of eruptions upon the skin, but no bodies of this sort were obtained except from the last 4 cases of scarlatiniform antitoxin rash. In these cases the blistering fluid was left on longer and the bodies found could not be differentiated from those found in the blister fluid of measles and scarlet fever.

Field concludes that these bodies are probably products of degeneration and cytolytic activity, and for the reasons given above one is strongly inclined to accept this conclusion; in fact, I think we may go further and accept it without any reservation.

STREPTOCOCCI AND SCARLET FEVER. Another closely allied question is that of the relation of streptococci to the etiology. Numerous references

¹ Journal of Experimental Medicine, 1905, 7, p. 343.

to this question have been made in earlier articles. There still remains much work to be done along this line and note is made of an article by Jochmann¹ who discussed at great length the relation of the streptococcus to scarlet fever. The article is a valuable one, for it is based upon considerable original research and a careful review of the literature. The conclusions reached are in accord with those generally held, that the streptococcus so often found in association with scarlet fever is not a special form of streptococcus, and that while it is the cause of most of the common and severe complications it is not the cause of the disease itself.

THE BLOOD IN SCARLET FEVER. During the year not much has appeared in the journals upon the various individual symptoms of this disease. Among the articles is one by Tileston and Locke² who report a study of *the blood picture in scarlet fever*. This disease causes a slight secondary anaemia, a fall of from 5 to 25 per cent. in haemoglobin and of from 100,000 to 700,000 red blood corpuscles. The blood returns to normal in a few weeks. Considering the severity of this disease and its close relation to diseases of the septic type, which so rapidly produce marked anaemia, the results noted by Tileston and Locke are surprising. Leucocytosis of the polymorphonuclear type appears early, the count rises abruptly on the second to eighth day to 18,000 to 40,000, then falls rapidly for a few days and then more gradually to the normal in three to six weeks.

Tileston has pointed out that the course of the leucocyte count in *measles* is different. Here, too, there is a leucocytosis, but instead of coming on early and suddenly it is delayed and the number of white blood cells increases gradually to a maximum, reached at the end of the second week. The count stays at the high level for about a week and then falls irregularly to the normal.

Complications, with few exceptions, exert no influence upon the blood in scarlet fever. If severe they may increase the anaemia and in a few instances (nephritis and diphtheria) even produce a rise in the leucocytosis.

RELAPSE AND SECOND ATTACKS OF SCARLET FEVER are fortunately exceptional things. Bleibtrau³ reports the case of a child of seven years, who had a second attack of scarlet fever six weeks after the beginning of a mild but typical infection. The scarlet relapse was somewhat more severe than the primary attack. The fever lasted longer and was complicated by a transient arthritis and nephritis. Henoch in his textbook reports but 8 such cases and Körner in a review of the literature

¹ Zeitschrift f. klin. Medizin, Bd. lvi. p. 316.

² Journal of Infectious Diseases, 1905, 2, p. 375.

³ Münchener med. Wochenschrift, 1905, p. 1767.

assembled only 40. Most of these relapses occurred within three weeks, only 3 of them being delayed six weeks or two months.

Bleibtrau also reports the development of striae in the skin of the buttocks and knees after a scarlet fever. Such striae have been observed after other infections, notably typhoid fever and dysentery, but so far have not been seen to follow scarlet fever.

MEASLES AND SCARLET FEVER. The influence which the different infections exert upon each other, where both are active in the same individual at the same time or when they follow closely one upon another, is of great interest and the amount of material available for arriving at conclusions is not great. We, therefore, quote the following in which Riset¹ draws these conclusions from 35 cases of measles developing in the course of scarlet fever:

1. Measles may develop in any stage of scarlet fever.
2. The measles eruption after scarlet fever shows a marked tendency to be atypical.
3. The course of the temperature of the measles is not influenced by the antecedent scarlet fever.
4. The other clinical symptoms, the complications, and sequelae occur in the typical way.
5. The fall of the temperature of the scarlet fever is prolonged when it takes place during the incubation period of the measles.
6. Measles after scarlet fever must be regarded as a very serious complication.

HYPERTROPHIED TONSILS AND ADENOIDS IN SCARLET FEVER. Jarecky² in concluding an article upon the ear complications of scarlet fever makes one point which is not new, but which is so often forgotten that it may be well to mention it. He points out the necessity of removing hypertrophied tonsils and adenoids in children. There are many good reasons for doing this, but one which is often forgotten is that in the course of the various infectious diseases in which throat symptoms are common, notably scarlet fever and diphtheria, an obstruction which is ordinarily not troublesome may become a serious source of danger. In both of these diseases the danger of middle ear and meningeal infections is very greatly increased, and in some instances the swelling of the enlarged tonsils with the accompanying peritonsillar edema may require tracheotomy.

SERUM THERAPY OF SCARLET FEVER. Every one is watching with great interest the progress of the serum therapy of this disease, and while progress is not being made as rapidly as it was with the diphtheria,

¹ Jahrbuch f. Kinderheilkunde, 1905, No. 50.

² Medical Record, 1905, 1-2, p. 92.

because of the many difficulties in the way of manufacture of the serum and the resulting limited supply, still progress is being made and in general the reports are favorable. It is not likely that the Moser polyvalent serum will ever attain the position occupied by the diphtheritic serum, for its manufacture is not based upon the use of pure cultures of the specific cause of scarlet fever.

Ganghofer,¹ of the pediatric clinic in Prague, has published a report of his experience with the use of the Aronson and with the Moser anti-streptococcus serum in the treatment of scarlet fever, and while the experience does not cover a very large series of cases they make a material addition to our yet limited number of cases handled in this way.

Fifteen severe cases were given from 10 to 60 c.c. of the Aronson serum, with a mortality of 46 per cent. The temperature in some cases showed some reduction the day following the injection, but inasmuch as the comparison is made between the highest temperature of the day of injection and the lowest temperature of the day following one must agree with Ganghofer that the serum had but little effect. The experience with the Moser serum is still more limited and less favorable; of 8 cases injected 5 died. Only 2 of the cases were injected during the first forty-eight hours of the disease, the period during which Moser and Escherich expect results. Both of these cases recovered. The other cases were injected on the third, fourth, or fifth days and only one recovered.

Ganghofer seems more impressed by the improvement noted in certain cases than by the percentage of mortality, and in so limited a series as this one's judgment would and should be more influenced by the individual observations than by the total results. The temperature was more influenced by this serum than by the Aronson serum; the pulse was slowed and improved in character, and the general condition of some much improved.

v. Bokay² after a brief review of the results obtained during the past two years with the Moser serum adds his own conclusions based upon its use in 17 cases, all of which recovered. He believes that the serum favorably influences the general condition of the patient within twenty-four hours, and that this is true not only in the cases in which the temperature falls, but also in those which show but little drop in temperature. The rapid disappearance of the cerebral symptoms is particularly striking.

The rash pales after the injection in a truly surprising manner.

¹ Deutsche med. Wochenschrift, 1905, p. 529.

² Jahrbuch f. Kinderheilkunde, 1905, p. 428.

The average fall of temperature in the first twenty-four hours was 2.1°C . and was never accompanied by any collapse phenomena, but with a marked improvement in the general condition.

The pulse became at the same time less frequent and of better quality. The influence of the serum upon the throat changes is less positive.

According to v. Bokay's experience even large amounts of serum do not irritate the kidneys. In 15 cases showing an albuminuria previous to the injections the amount of albumin did not subsequently increase, but rather decreased.

Serum eruptions were common, but with one exception not severe.

Quest¹ from the Czerny children's clinic in Breslau reports upon a small experience with the Moser serum. The results were not brilliant even in the mild cases. In a few the injections were followed by a fall in temperature, but an improvement in the general condition was not marked except in isolated cases. The pharyngitis continued its course uninterrupted.

He also makes an interesting report on increase of weight during convalescence from scarlet fever. During the active period of the disease the loss of body weight is very rapid, but when the appetite returns the increase in weight is astonishingly rapid. The weekly increase varied from 214 to 875 grams and averaged 522 grams in 15 cases ranging from two to thirteen years of age. The increase bore no obvious relation to the age of the child; a child of two gained 1200 grams in two weeks; another of nine gained only 800 in four weeks; a child of eleven gained 5000 grams in less than six weeks.

Gordon² describes under the term "toxic scarlet fever" cases which are semicomatose, cyanosed, with rapid feeble pulse, rapid respiration, dilated pupils. These cases often die within the first twenty-four hours, and Gordon's experience leads him to the opinion that in the absence of adequate specific treatment about 80 per cent. die.

During the past two years he has been using a polyvalent antistreptococcus serum prepared in the Wellcome laboratory, and has administered it to 50 out of 55 toxic cases. It was also given to 5 cases of the septic toxic type. At first 20 to 40 c.c. were given, but later this was increased to 50 or 100 c.c., usually given in one injection on admission. Of these 55 injected cases 13 died, a mortality of 23.5 per cent. No ill effects were seen from the serum except a transient erythema. While Gordon does not wish to draw any general conclusions from this number of cases he believes that there can be no doubt that the serum saved the lives of some of these cases.

¹ Deutsche med. Wochenschrift, 1905, p. 988.

² Lancet, 1905, 1, p. 1496.

RED LIGHT IN SCARLET FEVER. The therapeutic use of *red light in infectious diseases* is not new, but its use in the treatment of smallpox has attracted so much attention that little thought has been given to its possible effects upon other exanthemata. It has been thought to favorably influence the course of erysipelas and measles and now Cnopf¹ reports a study of its effects upon scarlet fever based upon an experience with 14 cases. He believes that the temperature is influenced in certain cases so much that it falls almost by crisis, reaching the normal level in four to six days. The eruption quickly disappears in the red light, but when the patient is brought into daylight the eruption reappears in the course of a few moments.

The course of the scarlet fever was not shortened by the red light, but it appeared to have a favorable effect upon the initial stage of the disease.

PREVENTION OF SCARLATINAL NEPHRITIS. Among the many complications of scarlet fever there is none of greater importance than that of *nephritis*. This is true not alone because of the effect which it may have upon the immediate mortality, but also because of the possibility of its causing permanent and irreparable changes in the kidneys. For years it has been customary to guard against this complication by careful restriction of the diet. Recently there has been a very considerable use of *urotropin* as a prophylactic measure. Both these means have been discussed during the year in articles quoted below.

Another aspect of the same question is that of the influence of an intercurrent scarlet fever upon an existing nephritis.

Eichorst² has discussed the interesting question of the influence of acute infectious diseases upon chronic nephritis. One would certainly expect any one of them to have a most injurious effect and particularly would one fear the influence of an intercurrent scarlet fever. Eichorst reports 2 cases, 1 of chronic hemorrhagic and 1 of contracted kidney, in whom an intercurrent scarlet fever was followed by a remission of all of the symptoms of nephritis and the excretion of urine in all respects normal. Eichorst does not believe that the kidneys have returned to the normal condition nor does he think it reasonable to hope that the return to the clinical normal will be permanent. The same curious fact has been seen with erysipelas.

Reference has been made in previous articles to the use of urotropin in scarlet fever to prevent a complicating nephritis. Reports upon this practice have increased in number and the opinions vary. Some recommend its use highly; others believe that it has no value. Preisich³ has collected the reports of various authors who represent all shades of

¹ Münchener med. Wochenschrift, 1905, p. 1540.

² Medizinische Klinik, for September 24, 1905.

³ Therapie der Gegenwart, 1905, p. 211.

opinion covering 256 cases of scarlet fever with 18 cases of nephritis—*i. e.*, 7 per cent. He adds also a very rich personal experience gained in a recent epidemic in Budapest; 600 cases were given urotropin three times daily during the first three days in the hospital, and again for three days after a period of two weeks; 55 of these cases—*i. e.*, 9.16 per cent.—developed nephritis; 600 other cases treated in the same hospital and in other respects in the same way, but receiving no urotropin, showed 82 or 13.66 per cent of complicating nephritis. That is, the nephritis is 30 per cent. less common if urotropin is used. Preisich from his observation advises the use of the urotropin at the end of the first and third weeks. It may also be given for two or three days in the intervals.

In contrast with this report is that of Garlipp¹ who treated 82 cases of scarlet fever with urotropin and had 21 cases of nephritis. This includes only cases which showed albumin and blood casts. He does not think that the urotropin had any effect in the way of causing the nephritis and reports his unfavorable experience that others may not be led to hope too much.

Dufour² during the year 1904–1905 had charge of 268 cases of scarlet fever with the very low mortality of 1.5 per cent. Only 4 deaths occurred and all of these in adults. Two of these were alcoholic, one suffered from chronic lead poisoning, and the fourth case was one of scarlet fever in the puerperium. But little is said of his plan of caring for his cases except that he is no longer enthusiastic over the hydrotherapeutic measures, but wishes to recommend bleeding in the toxic cases, even in those which show no evidence of nephritis. Otitis media, frequent at the beginning of the year, has disappeared since the employment of free lavage of the nose.

The most important part of this article is that devoted to the discussion of the *diet during scarlet fever*, a question of extreme importance. Dufour has abandoned the rigid milk diet advocated by so many and has allowed his patients to eat as soon as their appetite returns. The food consisted of milk, eggs, meat, fish, and fresh vegetables. None of his cases left the hospital with a nephritis or albuminuria. Some patients had a febrile albuminuria and were on principle placed on a milk diet, but were allowed solid food as soon as the daily urinalysis showed a disappearance of the albumin. In several cases showing early albuminuria a diet free from chlorides was given. In none of these did a nephritis develop. In 5 cases of albuminuria the addition of 6 to 20 grams of salt to milk did not cause a reappearance of the albumin even when given the day after the albumin has disappeared on a chloride free diet.

¹ Medizinische Klinik., 1905, p. 811

² Bull. et memoir de la Soc. méd. de Paris, 1905, p. 454.

One must not be too ready to accept these conclusions of Dufour. It is evident that his cases must have averaged mild, and to transfer an experience with a mild epidemic into a rule for general guidance would be a serious mistake.

The article caused some discussion, and Comby, whose experience covers several thousand cases treated in different epidemics and in different places, says that Dufour's article merely proves that one can sometimes commit with impunity serious therapeutic and hygienic faults. Comby places his cases for twenty days on an absolute milk diet and then for twenty-four days on a diet of milk and vegetables. With this rule he has never seen a case of nephritis follow scarlet fever. The only cases of this sort which he has seen have been in patients given meat too early.

Béclère in continuing the discussion of this subject lays down certain important rules: It should be the first care of a physician when called to a case of scarlet fever to examine the urine every day for albumin and to note even the faintest trace. This should be continued throughout the entire course of the disease, but it is especially important during the eruptive period of the disease. If no albumin appears during the febrile period it is not likely to appear later, and in such cases the patient requires during convalescence only such care as should be given to any patient recovering from an acute infection. But on the contrary, if a given case of scarlet fever presents at any time any trace of albumin in the urine, no matter how slight or for how short a period, the patient should be kept in bed on a milk diet, even to the completion of the desquamation.

Ziegler¹ expresses himself as strongly in favor of a *strict milk diet* as a prophylactic measure against a complicating nephritis. He has employed it in 231 cases over a period of twenty-one years without seeing a single instance of scarlatinal nephritis. Of 10 cases not on the milk diet 9 developed nephritis. He refers to the experience of Zuppinger who has seen the most severe nephritis follow scarlet fever in spite of strict milk diet and rest in bed, and also to that of Piza who was unable to avoid nephritis by the use of a milk diet.

Dopter² has had some experience with a *chloride-free diet* in the treatment of scarlet fever. During December, 1903, he experienced an epidemic of severe scarlet fever, which was characterized by the number of cases of nephritis which developed in spite of the fact that a milk diet was kept up during the first three weeks of the disease. In 21 cases treated during this month and the following, 5 developed a secondary nephritis and 2 an albuminuria.

¹ Centralblatt f. Kinderheilkunde, 1905, p. 165.

² Bull. et memoir de la soc. de méd., 105, p. 523.

In February the use of a chloride-free diet was begun in some cases, while the milk diet was given to others. Of 25 cases on a milk diet, 4 developed nephritis and 3 albuminuria, while none of the cases given the chloride-free diet showed even the faintest trace of albumin. During March all the cases were given this diet and no case of albuminuria developed. Dopfer is in doubt as to whether this was mere good fortune or the result of the treatment.

The employment of *venesection* in the treatment of *uræmia* is now generally regarded as the most rational thing which one can do. If this is true of the *uræmia* which results from chronic nephritis it is still truer when the *uræmia* appears in the course of acute scarlatinal nephritis.

Singer¹ contrasts the results of venesection in 17 cases of *uræmia* with scarlatinal nephritis and 2 deaths—*i. e.*, a mortality of 12 per cent.—with 9 cases treated without it and a mortality of 44 per cent. The operation is the most rational and most useful therapeutic means we have. It is easy and safe, but two things must be kept in mind; if too little blood is withdrawn the procedure is without result, and in severe cases, if the improvement does not take place or is only transient, the bleeding should be repeated in twenty-four to thirty-six hours. The amount of blood to be withdrawn varies with the age and size of the child and with the severity of the symptoms. According to Baginsky $\frac{1}{5}$ to $\frac{1}{20}$ of the total amount of blood can be removed without danger; 80 to 120 c.c. of blood were the amounts usually removed.

Bleeding is particularly indicated in cases showing signs of cerebral irritation; comatose cases are not injured by it, but there is not much prospect of results. It is indicated not only in strong but also in weak, anæmic children if the pulse is tense. When the pulse is filiform bleeding is usually useless. Bleeding should be done early, during the first *uræmic* attack.

Salge² has a short article entitled “Shall a Mother with *Scarlet Fever* nurse her *Child*?” which is quoted not because it contains anything new, but because it is a protest against the too common practice of taking the child from the breast whenever the mother is ill from any cause whatever. The case reported is that of a young mother who had a rather severe scarlet fever about five weeks after delivery. She was allowed to nurse the child throughout her illness, except for a short period when the secretion of milk stopped. The child did not suffer in any way nor did it acquire the scarlet fever, to which children under six months are almost perfectly immune. The greatest danger to the nursing child

¹ Jahrbuch f. Kinderheilkunde, 1905, p. 417.

² Berliner klin. Wochenschrift, 1905, p. 1149.

from a mother with scarlet fever is that of infection with the streptococci which are always present in scarlet fever. The danger of their transference through the milk is, however, slight.

Dufour, whose article is referred to elsewhere, also discussed the propriety of a mother continuing to nurse her child during the course of a scarlet fever, and he favors it without reservation. He also holds that it is necessary in order to maintain a proper milk secretion to feed the mothers as usual rather than to restrict them to a milk diet. During the year 1904-05 he cared for ten nursing mothers through scarlet fever and treated them all in this way except a mother who died from a puerperal scarlet fever. Only one mother lost her milk.

Smallpox. While there have been numerous additions to the literature of smallpox, there is only one question which will be referred to here, namely, that of the relation of the *protozoa-like bodies* which have for some years been described in connection with this disease. The question of their nature is still open to discussion and the same theoretical objections to their having an etiological bearing can be urged as have been urged against the protozoa of scarlet fever. The work of Jurgens, De Korte, and Wasilewski seem to indicate that these bodies are actually protozoa, but even if they are it does not follow that they cause the disease.

Jurgens¹ has been employing inoculation of the cornea of rabbits as an aid to the differentiation of variola from other conditions which may be mistaken for it. With a very pointed and very sharp lancet some of the contents of the pustule are introduced into the cornea, care being taken not to open the anterior chamber of the eye. It is best to make several such inoculations of the cornea and then some of the contents of the pustule can be put on the cornea. The wound must be so fine and so superficial that they are just visible on focal illumination. Within 12 to 24 hours the points of inoculation show signs of growth of the epithelium without clouding from the cornea. After two days these spots are elevated above the level of the cornea. This swelling still further increases, the surface is thrown off, and ulcers develop. After inoculation with fluid from a varicella eruption or from any source other than the variola, the reaction is much less, there is no swelling, and all signs disappear promptly.

Microscopic examination of the cornea shows cell inclusions which it is not always easy or possible to distinguish from immigrated leucocytes, fragments of cells, and the like. The number of these inclusions increase from day to day, and while at first they are found only in the epithelial cells of the track of the lancet, they are later, after 3 to 5 days, found in the surrounding cells. During the first hours after the inocula-

¹ Charité Annalen, 1905, No. 127.

tion these bodies are all small, but later they increase in size and from then on show great variation in size. Jurgens believes that these bodies are not leukocytes or parts of leukocytes, that they are not derived from the epithelial cells, and that they are very probably the bodies causing the variola.

Similar inoculation experiments have been made with vaccine and similar bodies have been found. The inoculations have been carried by v. Wasielewski through 46 generations of rabbits, Jurgens also has repeated the inoculations on the 1, 2, 3, 5, 10, 20 and 30th day, and the characteristic macroscopic changes and these same bodies could always be seen.

De Korte¹ describes a method of culture of what he terms the parasites of smallpox and vaccinia. He employed as culture media the vitreous humour of the rabbit's eye. Cultures on defibrinated blood and on sera were negative; infection material of undoubted virility must be employed. The measurement of successful growth is indicated by the turbidity produced in the culture medium. This ranges from that of much diluted milk to that of laudable pus. After two subcultures it will be found that the reproductive force of the parasite has fallen so low as to be incapable of giving rise to a fresh generation.

This article is illustrated by plates and microphotographs which are interesting. It is pointed out that many points in the life cycle of these parasites remain obscure, and the views submitted are purely tentative. The parasites of smallpox show great uniformity of size of the amœbæ and the spores are for the most part intracellular; while the parasites of glycerinated calf lymph vary much in size and spores occur abundantly outside of the amœbæ as well as within them.

Schrumpf² in a discussion of the so-called protozoa of smallpox, described by Councilman and by Bosc, figures a large number of bodies which he believes are mere cell inclusions and have a purely protoplasmic origin, and which are similar to the protozoa bodies described.

De Waele and Sugg³ report that they have been able to find in the blood of variolous cases a *streptococcus* which is constant and peculiar. It is not agglutinated by the sera of newborn children, of unvaccinated persons or calves, but is in an increasing degree by the serum of patients with variola. The characteristic of the serum of the variola cases is specific for this particular streptococcus for it has no influence upon streptococci of other sources.

They have found in the vesicles of *varicella* a streptococcus, which is different from that of the variola, in that it is agglutinated by the serum

¹ The Practitioner, 1905, No. 378

² Virchow's Archiv., 179, 461.

³ Münchener medizinisch. Wochenschrift, 1905, 1188.

of varicella cases, but not by that of the cases of variola. They report, for example, a child with a severe varicella, whose serum agglutinated the varicella-streptococcus, but had no effect upon the variola-streptococcus until after the child had been vaccinated.

These authors think that it is possible that this reaction may be used to differentiate doubtful cases from variola and also to distinguish the variola from the varicella.

Tetanus. As has been already stated but little has been added during the year to our knowledge of tetanus. Almost all the articles, which have appeared, have been reports of isolated cases treated by some one of the numerous methods which have been proposed.

Anders and Morgan¹ have collected from the literature and by correspondence a list of 1201 cases of tetanus in the United States from 1850 to 1904. The list gives convincing proof that every case of the disease is the result of the introduction of the tetanus bacillus through a lesion of the skin, however minute it may be, and that so-called idiopathic or "rheumatic" tetanus does not exist.

The statistics show that the disease is endemic to all large centers of population. The sections of this country in which tetanus is most frequent are New York, Southern Pennsylvania, Virginia, Georgia, Southern Louisiana, Indiana, Illinois, and Southern California.

The disease is becoming relatively less common: Thus in 1870 there were 1627 deaths from tetanus in U. S. Census report, while the same report gives 2259 deaths for 1890. In addition to this it may be noted that the frequency of tetanus neonatorum is not only relatively but also absolutely less common. In 1870 there is recorded 975 cases and in 1890, 595 cases.

The influence of the season is shown in Table 4 of this article, covering 687 cases. There were 129 cases in July, 75 in October, 68 in September. The Fourth of July celebration accounts for the great number in this month.

A table covering 583 cases shows the influence of age. 39.3 per cent. of the cases were between 5 and 15 years; 24.9 per cent. between 15 and 25 years.

Of 981 cases, 778 were males *i. e.*, 79.3 per cent.

The table showing the location of the infection atrium is too long to be quoted in detail, but wounds of the foot were the commonest, with the hand next, a very close second. Together they make 58 per cent. of the total.

The *incubation period* is stated in 858 cases. 22.3 per cent. showed an incubation period of 5 days or less, with a mortality of 58.8 per cent.

¹ Journal of American Medical Association, 1905, 11, 314.

46 per cent. had an incubation period of from 5 to 10 days and a mortality of 63 per cent. The mortality rate in cases with an incubation period of from 10 to 25 days was between 40 and 42 per cent. Among cases lasting less than 5 days, the mortality was 81.4 per cent.; among those lasting from 5 to 10 days it was 63 per cent.; among those lasting 10 to 15 days it was 30 per cent.

The treatment consisted of local and general means. Among the local measures employed were carbolic acid, and immersion of the parts in ice and salt or putting the patient in a very cold room. The most important method is opening the wound freely under anesthesia. The general methods consisted in the use of chloral, bromides, and morphine.

The value of antitoxin after tetanus has once developed is still open to question, for reports of favorable results now and then made. Its prophylactic value may be regarded as firmly established.

Dolley¹ has been doing some work upon *blank cartridges* to ascertain whether or not he could find the tetanus bacillus. Similar work with negative results covering 759 cartridges has been previously reported by Wells, Taylor, Le Garde and the Boston Health Department.

Dolley's work also ended in a failure to find these bacilli although the wads of some cartridges, inoculated in rats, guinea-pigs and rabbits produced characteristic symptoms of tetanus.

So far the only one reporting the tetanus bacillus as found is R. N. Connolly, bacteriologist of the Board of Health of Newark who apparently bases his diagnosis upon the morphology and odor of the cultures and makes no report of inoculation experiments.

Rogers² advocates the *intraneural* and *intraspinal use of antitoxin*. The main nerves coming from the region of the infection atrium are exposed and from 5 to 20 minims of antitoxin are injected. Intraspinal injection of 20 to 30 minims were also employed. Rogers has used these injections in severe cases with three deaths.

Tuberculosis. This year, as every year, has seen the literature of this disease grow rapidly in mass, but in truth actual additions have been few. A very few points are touched upon in the following paragraphs:

THE HUMAN AND BOVINE BACILLUS. The question of the unity or duality of human and bovine tuberculosis was rather carefully reviewed in the 1904 volume of *PROGRESSIVE MEDICINE*. Since then a considerable amount of work has been done which tends to confirm the opinion, confirm it so strongly indeed, that we may accept it as a fact, that the two diseases are really due to different but closely allied organisms, and that while in general each keeps to its own peculiar territory, either

¹ Journal of the American Medical Journal, 1905, 11, 466.

² Ibid., 1903, 11, 12.

may affect the human or the cow. The relation of tuberculosis of birds and cattle has also been studied and the conclusion is that here again the diseases are due to different varieties of tubercle bacilli and that each may under certain conditions become pathogenic to animals of the other class.

SOURCE OF INFECTION IN TUBERCULOSIS. The statement of v. Behring that *milk* is the main source of infection with tuberculosis, has received some discussion during the year, but is in no way strengthened by such discussion. v. Behring's statement that infantile infection may leave behind no anatomical evidences, and bring about only functional changes, of which the most constant is an oversensitiveness to tuberculin, has been carefully studied by Beitzke,¹ in Orth's laboratory. Beitzke has worked with the idea that if infantile infection is so common and may exist without the production of tuberculous lesions, one should, by proper search, find tubercle bacilli in the blood of at least a few infants dying and showing at autopsy no tuberculous foci. He studied during 8 months 98 children posted and showing no foci. Of these only 48 fulfilled the conditions necessary for study. Blood was taken, with all the precautions usual in such work, from the right ventricle. Inoculation experiments and microscopic examination of the blood were made in all cases with perfectly negative results in 47 cases. In one case the animals inoculated showed submiliary grayish nodules in the liver and spleen. These nodules were free from tubercle bacilli and it was not certainly ascertained whether the lesions were truly tuberculous or not. Even accepting them as tuberculous foci, the case cannot be used to support v. Behring's idea, as the material was taken from a child dying two days after birth.

Bearing upon this same point is a report made by Wagener² upon 410 autopsies studied with particular effort to learn all cases of *primary intestinal tuberculosis*. He found but 20 cases, equal to 4.9 per cent. There were 67 autopsies upon children from 1 to 15 years of age, with 11 cases of primary tuberculosis of the intestines, *i. e.* 16.4 per cent. In 67 autopsies on children under one year of age there was no such infection.

In this connection one may recall Baginsky's 5448 sections with 14 cases of primary intestinal tuberculosis, v. Hansemann's 8000 to 10,000 sections with 25 cases, and Orth's 203 sections with 2 such cases. Wagener in 1903 reported 600 sections with 28 cases of this class.

THE BLOOD IN TUBERCULOSIS. Ullom and Craig³ published from the Henry Phipps Institute of Philadelphia an account of a study of

¹ Berliner Klinische Wochenschrift, 1905, 33.

² Ibid., 119.

³ The American Journal of Medical Sciences, 1905, 2, 435.

the blood in pulmonary tuberculosis from which they draw the following conclusions, being fully convinced, however, that the series is too limited in number and the field covered too narrow to make deductions which could be considered by any means final:

1. In pulmonary tuberculosis without cavity formation a mild anaemia, with a decrease in erythrocytes and a relatively greater decrease in haemoglobin, is constant.

2. From the standpoint of prognosis an increase of the erythrocytes, in cases without cavity formation, is of favorable significance.

3. In advanced cases a decrease of the leucocytes is of unfavorable import.

4. In their investigations they have received the impression that the actual increase of lymphocytes seems to correspond to the increase of resistance on the part of the organism to the tuberculous infection, but further study is required to confirm this deduction.

5. The transitionals seen to follow the same rules as the lymphocytes.

6. At the beginning of the investigation the eosinophiles seemed to increase with the patient's improvement, but further study did not support this view.

PNEUMOCOCCI A CAUSE OF PULMONARY HEMORRHAGE. The fact that pulmonary hemorrhage in the course of pulmonary tuberculosis is apt to occur more frequently at certain times than at others, that there seems to be periods of epidemics of such hemorrhages, has been noted for years by numerous observers. Usually atmospheric conditions have been adopted as the explanation of this fact, but recently a number of investigators have become dissatisfied with this explanation and have studied the matter in its bacteriological bearing. Flick, Ravenel, and Irwin¹ have studied the expectorated blood in a number of cases of this sort and found the pneumococcus to be present in all. In some cases this organism was obtained in pure cultures but in most instances it was associated with strepto- or staphylococci, so that one may ask why the authors refer the hemoptysis to the action of the pneumococcus rather than to these other organisms. In spite of the fact that blood is usually present in the sputum in pneumonia, the pneumococcus has but little tendency to excite a hemorrhagic diathesis.

TUBERCULIN ADMINISTERED BY THE MOUTH. Freymuth² has been stimulated by the effects of tuberculin given by inhalation to try the use of this agent by mouth, although Koch states that it has no influence when given in this way. Seventeen cases of pulmonary tuberculosis showing bacilli in the sputum and free from fever were selected. Of these 5

¹ Medical News, 1905, 2, 492.

² Münchener medizinische Wochenschrift, 1905, 6, 2.

showed a marked reaction, 5 a moderate reaction, and 7 showed nothing. In each case in which the reaction occurred it was in all respects typical, a latent period of a few hours, followed by a sharp rise in temperature, a fall after a few hours and usually some feeling of reaction, but less than after injection. Thus it appears that 59 per cent. of cases, certainly tuberculous reacted to tuberculin given by the mouth.

Forty-seven cases were then selected, in which there were reasons to suspect a tuberculosis of the lungs but in which there were no tubercle bacilli in the sputum and no fever. Eight of these gave a sharp reaction, 19 a distinct reaction and 20 none or too little to be significant. Of the 19 cases giving a distinct reaction, one is excluded because it developed a fever independent of the tuberculin at about the time of its use. The other 18 were given tuberculin subcutaneously, and 16 reacted very sharply.

The method employed in giving the tuberculin by the mouth is as follows: The dose varied from a minimum of 5 to 10 milligrams to 100 milligrams, it was given on an empty stomach shortly after the administration of a small dose of bicarbonate of soda, which had been given with the idea of neutralizing any hydrochloric acid present. Later it was given in the shape of keratine covered pills. The advantages of this method over the ordinary subcutaneous administrations are not great, but it is interesting to know that the tuberculin is active when given by the mouth, if it is protected from the action of the gastric secretions, and occasions do arise when its use in this way will be convenient.

Typhoid Fever. Of all the acute infections there is none more interesting than this, and the year's work has increased our knowledge of the subject.

During the year the report of the Board appointed by the United States Government upon the "Origin and Spread of Typhoid Fever in the U. S. Military Camps during the Spanish War" has appeared. Much important information upon this deplorable epidemic has been recorded in permanent form, but for the purposes of this article it will be sufficient to mention that the disease became epidemic in camps in both northern and southern states, in large camps and small ones. "Infected water was not an important factor in the spread of typhoid fever in the national encampments of 1898." It is stated that *flies* were unquestionably carriers of infection, a fact of primary importance in view of the fact that proper disposal of the human excreta was found to be very difficult. The mortality in 20,738 cases was 7.61 per cent.

Nash¹ in a short article read before Section of State Medicine of the British Medical Association upon the relation of *shellfish* to the spread

¹ British Medical Journal, September 16, 1905.

of typhoid fever states that among 830 patients suffering from acute infections other than typhoid only 6 gave a history of having recently eaten or handled shellfish; while 93 of 149 typhoid patients gave such a history. While such figures cannot be taken as proof, they are certainly interesting and very striking in the way of confirmation of the other evidences supporting the idea that shellfish of various sorts can convey typhoid bacilli. It is unnecessary to state that the circumstances which would give such high figures as those quoted must be very special and not at all those seen in the usual practice.

TYPHOID AND PARATYPHOID BACILLI. Herbert Fox¹ publishes a carefully prepared article upon the typhoid, paratyphoid and paracolon infections based upon a review of the literature and upon some personal work. The article contains much information which is valuable to those especially interested in this subject, but the differentiation of these conditions is still beyond the facilities of the average practitioner. So far as the demands of practice are concerned it makes little difference which infection is at work. The cases must be handled in exactly the same way; the prognosis does not differ materially, and while the average duration of the paratyphoid infection is shorter than that of the typhoid, exceptions to each are so common that the existence of the difference is of no especial consequence.

In view of the active discussion of the relation existing between the typhoid and the paratyphoid bacilli, and the clinical pictures resulting from them, the work of Tarchelli² becomes most interesting. He placed small glass tubes containing pure bouillon cultures of the colon bacillus in the peritoneal cavity of rabbits and after varying periods—days to months—examined the cultures and found that some of them had undergone marked changes; they no longer coagulated milk, and did not produce gas in lactose bouillon. In a word, if they were not true typhoid bacilli they were at least paratyphoids.

These experiments lead Tarchelli to the conclusion that the ordinarily harmless colon bacillus may become virulent under certain circumstances, and causing a generalized infection, is transformed into the Eberth bacillus under the defensive influences of the organism.

The idea is an interesting one, and the numerous bacilli lying between the typhoid and the colon bacilli, their close resemblance to each other, and to the extremes of the series, are suggestive.

INCUBATION PERIOD OF TYPHOID FEVER. Opportunity for determining with any accuracy the incubation period of typhoid fever is so infrequent that each instance is worthy of note. In the 1904 volume of

¹ University of Pennsylvania Medical Bulletin, 1905, 52.

² Semaine Médicale, 1905, 68.

PROGRESSIVE MEDICINE, the instance of a hospital patient who swallowed a typhoid culture with suicidal intent was quoted; this patient developed a typical typhoid, the first symptoms appearing on the third day, with rose spots and splenic tumor on the ninth day.

In the *Semaine Médicale* of January, 1905, there is a short note of an experience of a young Russian physician, who accidentally aspirated a small amount of a bouillon culture of typhoid bacilli into his mouth, making a Widal. In spite of immediately washing his mouth with a bichloride solution, typhoid fever developed. In this instance the first general symptoms appeared on the fifth day and the rose spots and splenic tumor on the thirteenth day.

SIGNIFICANCE OF THE VARIOUS SYMPTOMS OF TYPHOID. Treupel¹ has an interesting article upon the diagnostic significance of the various clinical symptoms based upon a series of 60 cases observed during the last two years. It is not safe to utilize conclusions based on so short a series for purposes of generalization, for typhoid, like other disease, varies from time to time. In one epidemic certain symptoms will be common while a year or more later they may be quite rare.

The results of Treupel's observations are collected in a table which has been modified here so that the symptom most constant is placed at the head of the list and the others follow in order of frequency.

	Number.	Per cent.
(1) Bacilli in the blood (only 14 cases examined in this way) . . .	13	= 92.8
(2) Widal reaction (only 53 cases)	48	= 90.6
(3) Splenic tumor	52	= 86.7
(4) Relative bradycardia	52	= 86.7
(5) History suggestive of typhoid	45	= 75
(6) Diazo reaction	44	= 73.3
(7) Roseola	43	= 71.7
(8) Disturbance in abdomen, as tympany tenderness and the like	37	= 61.7
(9) Angina	35	= 58.3
(10) Strikingly good general condition	34	= 56.7
(11) More or less bronchitis	29	= 48.3
(12) Typical fever curve	28	= 46.7
(13) Typhoid tongue	10	= 16.7

OCCULT BLOOD IN TYPHOID FEVER. This subject has been reviewed by J. Dutton Steele in the December issue of PROGRESSIVE MEDICINE, p. 84:

WIDAL REACTION IN TYPHOID. Lentz² reports a case of typhoid, typical and moderately severe, in which the Widal reaction could not be obtained. On the twenty-eighth day of the illness a severe *intestinal hemorrhage* occurred, and from then on a Widal reaction of 1 : 100 could be obtained. Apparently the loss of blood excited the formation of agglu-

¹ Münchener medizinische Wochenschrift, 1905, 18, 70.

² Klinische Jahrbuch, 1905, 14, 463, 475.

tinins. It was also noted that the course after the hemorrhage was milder than before, that, in other words, the patient was better for the bleeding. I personally have noted marked improvement in typhoid fever after a hemorrhage. The observation, however, is not a new one, as Graves speaks of it, and Trousseau was of the opinion that a hemorrhage in typhoid fever was not bad providing it was not too large.

Lentz in the same journal publishes an article of great importance upon *chronic typhoid bacilli carriers*. He examined the stools of over 400 patients convalescent from typhoid fever for the bacillus and whenever they could be found for a period longer than 10 weeks after the beginning of the typhoid or the beginning of a relapse, he speaks of the patient as a chronic bacillus carrier. He found but 6 persons of this sort and they continued to pass bacilli for varying periods, ranging up to 13 months. He also examined the excreta of 20 persons who had had typhoid and found bacilli in the excreta after periods ranging from a few months up to fifteen years. They were well at the time the examinations were made and there was no reason to believe that they had been exposed to opportunities for reinfection. To nine of these records Lentz adds notes of cases which have apparently started from these chronic infection carriers. Of the twenty-seven cases tabulated nineteen are women. The cause for this great disproportion of women is probably to be found in debilitating causes to which they are exposed, such as childbearing, and over-work. Both these factors were present in all the nineteen women. In most of the others, causes which seriously disturb nutrition could be found. Lentz also found that if such cases were put to bed either at home or in a hospital, and by care and feeding brought to a normal condition of nutrition, the bacilli disappeared from the stools.

Examinations of the blood showed a peculiar Widal reaction in 10 of 11 cases examined in this way. There was a very distinct and immediate macroscopic reaction in dilutions of 1 : 20, but in dilution of 1 : 50 or 1 : 100 the reaction was feeble and appeared only after an hour or two. It is suggested that there must be a relation between the persistent presence of the bacilli and this long-continued Widal reaction.

All who have employed the Widal reaction in the diagnosis of typhoid fever have at times been troubled because the bacilli agglutinated so slowly. It is of great practical importance to have a culture which agglutinates readily and Sehrwald¹ has endeavored to find means of increasing this quality in cultures of typhoid bacilli. He found that growing the bacilli upon potato or upon media containing the juices of the potato have this effect to a marked degree, so that the time

¹ Deutsche medizinische Wochenschrift, 1905, 261.

required for complete agglutination is reduced to one-third or less. If the bacilli are later cultivated upon media containing no potato, they lose their increased agglutinability. They do not however lose it by being killed, so that dead cultures of the bacilli can be used in making the Widal.

Grumberg and Rolly¹ have made a careful study of the agglutinating power of the serum of typhoid fever patients upon the *paratyphoid* and allied bacteria. The result of this work is to strengthen the opinion that the Widal reaction is not a specific but a group reaction. Forty cases of typhoid, presenting the typical clinical picture, were studied. In 32 of these cases the diagnosis was confirmed by the demonstration of typhoid bacilli in the circulating blood. The effect of the serum upon the typhoid bacillus, the paratyphoid A and B, the bacterium coli, the bacterium enteridis Gärtner, bac. botulinis von Ermengen was studied. In the first place it is pointed out that no inference can be drawn as to the severity of the disease from the agglutinating power of the serum or from the number of bacteria in the blood. An estimation of the severity must be based upon the clinical picture as a whole. There is no relation between the number of bacteria and the agglutinating power of the blood; thus one case with very few bacilli in the blood had a very high agglutinating power (1 : 2000). Of these 40 cases studied, 70 per cent. caused an agglutination of the paratyphoid bacillus, and in 35 per cent. the agglutinating power was greater for the paratyphoid than for the typhoid bacillus itself. The influence upon the different forms of paratyphoid bacilli was not the same, sometimes agglutinating one and not affecting the other. The time at which this influence over the paratyphoid bacilli appeared varied from between the first and second to between the third and fourth weeks. Of 22 cases, whose blood was studied to determine its agglutinating power over the colon bacillus, 12 cases, *i. e.* 55 per cent., gave a positive reaction. Two different cultures of this bacillus were used and in some cases one would react and the other not. The reaction was never intense but it was distinct. The bacterium enteridis Gärtner was agglutinated in 100 per cent. of the cases, providing the serum was not diluted beyond 1 : 30. Even in dilutions of 1 : 40, 24 cases failed to agglutinate this bacillus, but in five cases the serum caused agglutination of this organism in even higher dilutions than the highest affecting the typhoid bacillus. Here again, as was stated for the paratyphoid bacillus, it cannot be said that the infection is due to the organism over which the serum has the greatest agglutinating power. The effect of the serum in 21 cases upon the bacillus botulinus von Ermengen was studied, and agglutination occurred in only 3 cases, in

¹ Münchener medizinische Wochenschrift, 1905, 105.

dilutions of 1 : 30. From this one must conclude that the Gruber-Widal reaction is not specific since the blood serum of typhoid patients may cause agglutination of allied bacteria and even in higher dilutions.

Manteufel¹ because of work upon 85 cases with positive Widal reaction agrees with the conclusions reached by Kortes and Steinberg. Of these 85 cases, 58 cases, *i. e.* 68 per cent., caused also agglutination of the paratyphoid bacilli, but in no instance was this true in higher dilutions than with the typhoid bacilli. When both forms are agglutinated the dilutions must be carried on not to 1 : 50 or 1 : 100 but higher, until the highest dilution for each form of bacillus is learned. They found no instance in which the paratyphoid was agglutinated in dilutions beyond 1 : 400. They note also that there is no parallelism between the intensity of the action of a given serum upon the various types of bacilli.

In a later number of the same journal Korte and Steinberg² question the conclusions reached by the authors just quoted. They have studied 70 cases which they subdivided into four groups: (1) Those in which neither the paratyphoid A or B is agglutinated (24 cases). (2) Those in which the paratyphoid A is agglutinated (7 cases). (3) Those in which the paratyphoid B is agglutinated (9 cases). (4) Those in which both are agglutinated (30 cases). In none of these cases was there agglutinating power over the paratyphoid bacillus equal to that over the typhoid, and there was no parallelism between the power shown by any given serum over one with the power shown by the same serum over the other.

From these contradictory reports one can only draw this conclusion, that at least clinically the serum test is not sufficient to enable one to differentiate the paratyphoid from the typhoid infection.

ABSCESS OF THE SPLEEN FOLLOWING TYPHOID. Federman³ reports an instance of abscess of the spleen following typhoid fever, a rare complication, ending in recovery after operation. The case presented itself as an ordinary typhoid except for the fact that from the day of entrance, approximately the tenth of the illness, there was a leucocytosis. The spleen was not at first palpable but became so later. The splenic tumor and the leucocytosis persisted after the patient became free from fever. After a period of ten days during which the patient was free from fever and complained only of slight pain in the left side, fever reappeared with the physical signs of a left pleurisy with effusion. Puncture of the pleura gave a cloudy fluid. The side was opened and the diaphragm found bulging upward. The diaphragm was punctured and on obtaining brown, stinking pus was incised and the abscess of the spleen drained.

¹ Münchener medicinische Wochenschrift, 1905, 1329.

² Ibid., 985

³ Deutsche Medizinische Wochenschrift, 1905, 586.

It is to be noted that the abscess in the spleen persisted for days without temperature and with only slight local symptoms, but was throughout accompanied by a gradually rising leucocytosis, which eventually reached 300,000. Another fact is that the diagnosis did not clear until after the appearance of a pleurisy and then only after the opening of the pleural cavity. This is in accord with other reported cases of sub-diaphragmatic suppuration, the case declaring itself through the pleura. The prognosis of such a case is very largely dependent upon its early recognition and prompt surgical treatment.

ALBUMINURIA IN TYPHOID FEVER. Stolte¹ in a brief article draws attention to the frequency with which albuminuria occurs in typhoid fever, and finds that in 371 cases, ranging from mild to severe, 60 per cent. showed this change in the urine. He points out that in a general way the more severe the case, the greater the probability that albumin will appear in the urine; 49 per cent. of the mild cases and 77 per cent. of the severe cases showing it, 81 per cent. of the fatal cases showed albuminuria. The author does not believe that any prognostic inferences can be drawn from the presence of an albuminuria except in the cases of complicating nephritis, all of which are serious.

MENINGISMUS TYPHOSUS AND MENINGOTYPHUS. Stauble² has contributed an article in which he mentions the fact that not rarely a typhoid fever begins under the clinical picture of a meningitis. He reports a case in which there was a purulent cerebrospinal meningitis due to the typhoid bacillus and to it alone. Such cases are very exceptional. Usually the meningeal symptoms are due to circulatory changes in the central nervous system, which are probably the result of the action of the typhotoxins upon these organs, but there is no reason why such cases as the one reported might not occur and no doubt as time goes on others will be added to the literature.

POST-TYPHOID INSANITY. Edsall³ has made a study of post-typhoidal insanity in childhood and concludes from it that this condition is more common than would be inferred and that many pediatricians do not mention the subject at all or do so only cursorily. There is also a striking difference between the opinions of clinicians and alienists as to the severity of this condition, the former looking upon it favorably, the latter unfavorably. The explanation of this divergence is simple, the alienist naturally seeing only the more severe and prolonged cases. The type of insanity varies, the mania being the most common, then the dementia, the melancholia, and the delirium of convalescence.

¹ Deutsche Archives f. klinische Medizin, 83, 197.

² Ibid., 82, 90.

³ American Journal of Medical Sciences, 1905, 1, 327.

Excluding the last type, all of which recover, the prospect of recovery is approximately 62 per cent.

TYPHOID PERFORATION. Morris Manges¹ reports upon the very interesting subject of typhoid perforation, basing his report upon 19 cases in 216 typhoids (8.8 per cent.) in the Mt. Sinai Hospital. The frequency with which perforation occurs varies in different epidemics and under different circumstances and methods of treatment, but attention must be attracted by such a percentage as 8.8. The highest figure quoted by Curschman is 3 per cent., and one must agree with his statement that this is extraordinarily high.

Manges brings out clearly the general clinical picture of these cases and lays especial stress upon the early presence of abdominal pain. This occurred in 17 of the cases, being absent once in a comatose patient and once in a delirious case. Other symptoms show great variability in their frequency and intensity. Distention of the abdomen was marked only six times, though it was moderate in eight other cases. Obliteration of the liver dulness was frequently noted, but in two cases this sign did not appear, and in two others it appeared only late. This alteration in the size and shape of the liver dulness is often of considerable value in the diagnosis of perforation, but all too frequently the attending physician can give no accurate information as to its size previous to the onset of the alarming symptoms. The temperature fell in 3 cases, rose in 9 and remained unchanged in 4. The pulse in no case fell but remained unchanged in 4 and rose in 12. The respiration rose in 10 and remained unchanged in 6. In no case did the number fall. The number of leucocytes rose 7 times, fell 3 times and remained unchanged 6 times. Flank dulness was found in a considerable proportion of the cases, 9 times in the 19 cases. Sixteen of these cases were operated upon with five recoveries.

In closing Manges makes the excellent point that the whole trouble with the diagnosis of typhoid perforation in the early stages is that the general practitioner wants too much for diagnosis. It is far better to occasionally make the mistake of operating without there being any perforation than of frequently operating after the clinical picture has become so clear that the patient has no chance of recovery.

J. A. Scott has made a study of 50 cases of typhoid perforations seen in the Pennsylvania Hospital since May, 1901. During this period 1948 cases of typhoid fever were handled with 153 deaths, a mortality of 7.8 per cent. Perforations occurred in 50 cases; only cases in which the diagnosis was confirmed by autopsy or operation are included. This placed the frequency of perforation at one-third of the fatal cases

¹ Journal of the American Medical Association, 1905, 1, 1000.

and in 2.6 per cent. of all cases. These figures do not differ greatly from those of Hector Mackenzie based upon the reports of four London Hospitals. There were 351 perforations in 9753 cases of typhoid, *i. e.* 3.6 per cent., and 351 to 1037 deaths, a little over 1 to 3. The figures given are much higher than those from the German clinics, where the highest figures are 114 perforations in 2000 autopsies, 5.7 per cent.

The age distribution of the cases is as would be expected, 36 of them were under 35 years. The youngest was eight and the oldest fifty-two years old.

The period of the disease at which perforation occurred in 32 cases, *i. e.* 64 per cent., was during the second and third week, 2.2 of these being in the third. 46 cases occurred between the second and fifth week, *i. e.* 92 per cent. The earliest perforation was on the second day. There was also one on the sixth day. Later inquiry into the first mentioned case showed that the boy entered the hospital not for a fresh but for a relapsed typhoid and that the perforation occurred during the relapse. The perforation on the sixth day occurred in a man in the midst of his work. The latest perforation was on the forty-sixth day.

The severity of the case has some bearing upon the liability to perforation as is shown by the fact that six of the cases were mild, ten moderately severe and twenty-seven were severe. In seven cases no previous history could be obtained and in two instances the patients were not thought to be ill at the time the perforation took place.

The usual distribution of the typhoid ulcers was in the lower portion of the ileum; 19 were within twelve inches of the ileocaecal valve, 6 between 12 and 24 inches, 4 between 36 and 48 inches, 4 in the appendix, one each in caecum and transverse colon and one in a mesenteric gland.

The size of the perforation varied from that of a pin point to the size of a fifty-cent piece. The smaller perforations were due to extension of the ulcer through all the coats of the intestines while the larger resulted from a gangrene or focal tissue necrosis involving a considerable area of the gut.

In the great majority of the cases, 42, there was but a single perforation; in 2 cases, 2; in 2 cases, 3; and in one each 4 and 6.

The most important local symptoms of perforation were pain, tenderness and rigidity. In 74 per cent. of the cases the pain began suddenly, was extremely severe and localized in a special zone. In 20 per cent. the pain was slow in onset and was generalized, while in 12 per cent. there was no pain at all. In connection with the pain of perforation, it is important to note that nearly one-half of the perforating cases presented abdominal pain at entrance. This pain usually disappeared after rest and regulation of diet.

As far as localization of the pain is concerned, in 9 cases it was in the right iliac region; in 12 on the right side; in 1 in the left iliac region; in 2 on the left half of the abdomen and in 3 in the lower half, both right and left sides being painful. That is, in 42 per cent. of the cases the pain was on the right side of the abdomen, while in 26 per cent. there was no localization.

Tenderness was noted in 37 cases and in 3 cases was absent. 7 cases were not under observation at the time of onset and in 3 cases the histories do not mention tenderness.

Rigidity was noted in 66 per cent. of the cases.

Abdominal distention was present in about one-half of the cases but was a late rather than early manifestation.

There were 22 cases available for study of the size of the liver dulness. In 12 it was of normal size, in 5 much diminished and in 5 it was totally absent.

One must agree with the conclusion drawn, that disappearance of the liver dulness cannot be regarded as a reliable sign of perforation, especially as this accident is apt to occur in cases where there is decided meteorism with resultant decrease or even disappearance of the liver dulness.

So far as general symptoms are concerned, Scott is not certain that any of them are of much importance, an impression which, it seems to me, deserves accentuation. All too frequently serious, even fatal, delay results from the demand that general symptoms should appear before the diagnosis is made. The diagnosis of perforation should rest upon the local symptoms and I personally believe that an exploratory laparotomy should be made whenever the suspicion of perforation appears reasonable. Some operations will be made unnecessarily but the total of recoveries will be greater than it would otherwise be if the operation is delayed until the diagnosis of perforation is certain.

Mitchell, McCrae and Goodall in recent articles have drawn attention to the occurrence of intestinal hemorrhage and of chills in perforative cases, but Scott found no hemorrhages in one-third of the cases and chills in but 14 per cent.

The effect of perforation upon temperature is given as follows. In 15 cases there was no change; in 5 cases there was an immediate fall, amounting in some cases to three or four degrees and followed by a rise, a course of temperature resembling that of intestinal hemorrhage. In 10 cases there was a slow fall in temperature, lasting from eight to twelve hours and usually bringing the temperature to or below normal. In 2 cases there was an immediate rise with subsequent fall and in 5 a slow rise with subsequent fall.

In 16 cases no count of the leucocytes was made, and in 7 there was

no previous history, thus reducing the number of cases to be considered to 23. In 10 of these the leucocyte count rose above normal; in 3 it fell and in 14 it remained unchanged.

39 cases were operated upon and of these 12 recovered.

Ten cases were diagnosed as perforation and the diagnosis proved to be wrong either by operation or autopsy. In 2 cases, appendicitis was mistaken for perforation; in 2 cases left basal pneumonia was the correct diagnosis; in 2 cases gastritis and enterocolitis were the cause of error; in 2 cases no cause for the symptoms leading to the diagnosis of perforation could be found. In one case, Zenker's degeneration of the right rectus was found, and in one a healed perforation with secondary rupture was diagnosed.

Seven of these ten cases were operated on with three deaths. None of the deaths can be attributed to the operation, one was from appendicitis, one from sepsis following suppuration of one knee-joint and one died seven days after operation from general toxæmia.

BONE METASTASES IN TYPHOID FEVER. Christides¹ was led by a number of clinical observations to a study of the osseous metastases of typhoid. The clinical picture which results varies, but at first there is local pain of differing degrees of severity and increased by pressure. Gradually the pain lessens and one can palpate a swelling which at some point is soft and fluctuating. If the fever of the primary disease has ended, an elevation of temperature to 38-40° C. The course of the temperature is often hectic. All the phenomena are capable of retrogression, the swelling can disappear or an exostosis may remain. If suppuration occurs, it may open spontaneously or may disappear by absorption or by surgical intervention.

Any bone may be involved and Christides cites examples of involvement of the femoral, pubic bones, maxilla superior, and of the vertebra.

When the vertebra are involved it is easy to see how the spinal cord may suffer pressure and the symptoms of a transverse lesion result. Such cases are recorded and this author adds a new one

Mention is also made of the fact that metastasis in the cartilages occurs and examples of chondritis of the costal cartilages and the more serious chondritis and perichondritis of the laryngeal cartilages are reported. Bacteriological examination in these cases shows that the metastatic processes are due to the typhoid bacillus. Whether or not the word metastasis should be used in connection with these complications of typhoid fever, which is a septicæmia and which is always accompanied by the presence of the bacilli in all the structures of the body, is questionable, but at least all will understand what is meant by the expression.

¹ La Presse Medical, 1905, 481.

STRICTURE OF THE OESOPHAGUS FOLLOWING TYPHOID FEVER. Plummer¹ has reported such a case. The patient had been through a severe typhoid and noticed the first time he was allowed semi-solid diet that there was some difficulty in swallowing. This difficulty progressively increased until six months later he was unable to swallow even liquids. The stricture was at the cardiac end of the stomach.

ENDOCARDITIS IN TYPHOID FEVER. This must be counted one of the rarest complications of typhoid fever. Harrington² reports an instance. The patient, a boy, aged seven years, entered the hospital after having been ill for about 10 days. At entrance the clinical picture was fairly typical of typhoid, although no rose spots or Widal were present. The pulse was regular, dicrotic and 136 per minute. The apex beat was in the fifth interspace within the nipple line. The heart dulness was within normal limits. There were no murmurs but the first sound at the apex was soft and toneless.

A week later, during which time nothing unusual was noted, severe abdominal pain came on suddenly, the leucocyte count rose to 33,000. The patient was laparotomized under cocaine and a perforation in the cæcum found. Death occurred ten hours later.

The autopsy report is that of an ordinary but severe typhoid except for the presence of infarcts in spleen and kidneys. The heart was pale but not especially flabby. Abundant vegetations concealed almost the entire mitral valve. Sections of the vegetations stained by the Gram method showed them to consist mostly of enormous masses of bacilli. Bacilli were found also in the infarcts and in small vessels. Harrington does not commit himself as to the nature of this bacillus but says it closely resembles the bacillus endocarditidis griseus of Weichselbaum.

This case, like most cases of endocarditis in typhoid, is the result of a secondary infection and follows the rule still farther in that the endocarditis is of the ulcerative type, leading to the formation of infarcts.

PERICARDITIS IN TYPHOID FEVER. Another unusual complication of typhoid fever is pericarditis, two cases of which are recorded by Moore in Volume XL. of the Saint Bartholomew's Hospital Reports.

The first case, a boy aged thirteen years, entered with an ordinary attack of typhoid, which followed a distinct but not severe course. Two weeks after entrance a friction sound was heard over the heart. After persisting for a few days it disappeared, then reappeared and finally the boy recovered.

The other case was in a woman, who ran through an attack of typhoid fever, which was ordinary in all respects except for a pericarditis, which appeared four days after entrance and lasted for one week.

¹ Illinois Medical Journal, July, 1905.

² Glasgow Medical Journal, 1905, 102.

CIRCULATORY ORGANS IN TYPHOID FEVER. Ortner¹ in an article upon the condition of the circulatory organs in acute infections, points out some things in regard to the *prognosis of typhoid fever*. He agrees with Curschman that the prognosis becomes unfavorable when the fulness of the arteries decreases and under the influence of the fall in pressure the diastols of the pulse disappears. Ortner also lays great stress upon the condition of the second aortic tone, and makes a bad prognosis when he finds a previously well-accentuated second aortic tone gradually getting weaker and weaker. Usually along with this comes a decrease in the fulness of the arteries and of the diastolism, but even if these are not decreased, a lessening of the second aortic tone is of grave significance. On the other hand, if with lessened fulness of the vessels and failing diastolism, the second aortic maintains its strength, the prognosis is favorable, other things being equal.

Ortner also stated, that as long as the second aortic tone does not return to normal strength, even though the temperature has fallen to the normal, a relapse must be feared.

LARGE AMOUNTS OF DRINKING WATER FOR TYPHOID FEVER. Cushing and Clarke² have been trying the effects of the forced administration of water to patients with typhoid fever. Formerly they had given an average of three pints of water per day but lately have been given amounts up to a gallon or more each twenty-four hours. While the course of the disease has not been shortened, the patients were much less uncomfortable. The mouth and tongue were kept noticeably cleaner and moist. Apathy, deafness, restlessness, delirium and other evidences of toxæmia have been appreciably lessened and complications, both major and minor, were few among the patients treated in this way.

The urine in these cases was pale and the specific gravity very low, 1001 to 1005. The amount ranged up to 200 ounces and higher. The number of baths required was less. Relapses were less frequent and hemorrhage and perforation less common. The mortality in 100 cases in which polyuria was produced was five per cent.

I can add from personal experience that there is no difficulty in having patients take this large amount of water, giving four to eight ounces every fifteen to thirty minutes during the day and larger amounts at longer intervals during the night. The general condition of the patients is very greatly improved. The urine shows not only great increase in amount, but albuminuria and casts are strikingly less frequent.

TREATMENT OF TYPHOID BACILLURIA. Easton³ reviews the literature of bacilluria in typhoid and records the experience gained in the Mas-

¹ Zeitschrift für Heilkunde, 1905, 26, 240.

² American Journal of Medical Sciences, February, 1905, 187.

³ Boston Medical and Surgical Journal, 1905, 2, 195.

sachusetts General Hospital in treating this condition with *urotropin*. For the past year this drug has been used as a part of the routine treatment of typhoid and in all 486 cases have been treated. Nearly all received 8 to 10 grains three times a day and some 15 grains three times a day. There were only three cases of painful urination and two of hæmaturia.

The drug is effective in destroying the bacilli in the urine and prevents the cystitis and pyelitis which has long been known as complications of this disease. The most important reason for employing it, however, is that the urine of these patients does not serve as an agent for the diffusion of the bacilli to other people.

TYPHOID FILTRATES IN THE TREATMENT OF TYPHOID FEVER. Richardson¹ has been experimenting with the use of typhoid filtrates in the treatment of typhoid fever, and reports that filtrates from typhoid cultures grown at body temperature for six weeks have little, if any, toxic power. When injected into guinea-pigs they cause no discomfort, while they cause a sharp reaction when given to typhoid patients, such reaction being characterized by a chill, rise in temperature and increased frequency of pulse and respiration. Richardson's idea is that such injections stimulate the body cells to the production of an excess of specific anti-bodies. These then attack the bacilli and by setting free their intracellular toxins bring on the chill and its accompanying manifestations. The best results might be expected in patients not already hyper-intoxicated while the injections might be a source of danger if the patient is already in such condition of extreme intoxication.

Twenty-two cases were treated in this way with two deaths, one from hemorrhage and one from pulmonary embolism.

Only five cases came under treatment during the earlier stages of the disease with the following result.

CASE 1.—Injections begun on 10th day. Normal temp. on 18th day.

CASE 2.—Injections begun on 10th day. Normal temp. on 18th day.

CASE 3.—Injections begun on 7th day. Normal temp. on 12th day.

CASE 4.—Injections begun on 8th day. Normal temp. on 20th day.

CASE 5.—Injections begun on 12th day. Normal temp. on 11th day.

It is apparent that the value of this method can be determined only by further experience with a much larger series of cases.

Whooping Cough. Martha Wollstein² has been studying the *bacteriology of pertussis*, with special reference to the agglutinating power of the patient's blood. A variety of organisms and bacteria have been introduced at various times as the cause of whooping cough but at present the

¹ The Journal of Medical Research, 1905, 13, 301.

² The Journal of Experimental Medicine, 1905, 7, 335.

one most generally believed to be the exciting agent is the influenza-like bacillus described by Spengler in 1897, and later found in a series of cases by Jochmann and Krause in 1901 and 1903.

Wollstein cultivated the bacteria from the sputum of pertussis cases, and found in 29 of 35 cases an influenza-like bacillus, which she believes to be the organism of Spengler. This organism did not stain by the Gram method and was especially abundant in sputum which had been washed for the purpose of removing, as completely as possible, the contamination from the mouth.

Agglutination tests were made with all varieties of bacilli found. The organism just mentioned reacted to the serum of the child in dilutions of 1 : 200 up to 1 : 500 in some cases. All strains of this bacillus were agglutinated by the serum of every case of pertussis in dilutions of at least 1 : 100, but the reaction was always highest and most complete with the serum of the patient from whom the bacillus was obtained. Serum from normal adults and children, who had never had pertussis, usually gave no agglutination, but a few did so in dilutions of 1 : 10.

The bacilli were found with greatest ease early in the attack, *i. e.* when the cough had persisted for about two weeks and the whoop was just established. Two cases examined during the catarrhal stage did not show them.

Rhein¹ publishes an interesting account of a *spastic diplegia* developing in a child, aged two and one-half years after a pertussis. The child was first seen eight months after the whooping cough, when it presented a spastic paralysis of the legs with slight stiffness of the arms and nystagmus. The child at this time was intelligent but later imbecility and general convulsions developed and death ensued at the end of 17 months. Numerous small microscopic hemorrhages were found in the brain and cord. The motor tracts from the internal capsule to the lumbar cord stained poorly, or not at all, by the Weigert stain. Various nervous disturbances have been for a long time described as following pertussis. Among those may be mentioned several types of psychoses.

More frequently visual disturbances are seen often in the way of a transient or permanent blindness, which may be due to various pathological processes, such as hemorrhage into the chambers of the eyes, or bilateral neuritis of the optic nerves. In a few cases deafness has complicated this disease.

Cerebral hemorrhage has been reported a number of times, but owing to the fact that the prognosis is usually favorable, the diagnosis is not conformed by autopsy. Children between the ages of two and four years are most prone to cerebral hemorrhage, which usually occurs

¹ Journal of the American Medical Association. 1905, 1, 697.

during a severe paroxysm. The hemorrhage is probably the result of increased blood pressure and venous engorgement.

Of the 21 cases cited by Rhein the hemorrhage occurred into the brain in 7; between the dura and skull in 2; into the meninges in 1; into the brain substance and meninges in 2; capillary hemorrhages occurred twice; hyperæmia four times and in three cases no pathological change was found. Changes in the peripheral nerves, so common after many of the acute infections are rare, only one case so far has been recorded and that in 1887 by Mœbius.

Rahner,¹ upon an experience gained from treating 200 cases of whooping cough with *antitussin*, reports but 10 per cent. of failures. *Antitussin* consists of 5 parts of difluorophenyl, 10 parts of vaseline and 85 parts of lanoline, and is used as an inunction upon the neck, breast and interscapular region. In all except twenty cases, the number and the severity of the paroxysms were reduced within five days, and recovery took place in between two and three weeks. The cases in which the remedy failed to give the desired relief were those complicated by rachitis, pneumonia or both. Complications, especially pneumonia, were prevented and there were no ill by-effects, even when the drug was used on sucklings.

Yellow Fever. Pothier, Hume, Watson and Couret² have taken the opportunity, furnished by the recent epidemic of yellow fever in New Orleans, to study the blood and report the finding of certain cells, not so far described, which seem to undergo developmental changes and which can be demonstrated in the stomach of a recently infected *stegomyia*. The cells are extracellular, are usually single and vary in size from twice the diameter of a pneumococcus to one-fourth the diameter of a red blood corpuscle. They are seen only in stained specimens and can be found only after the third day of the disease. No relationship could be traced between their frequency and the severity of the case.

It may be now accepted as proven that yellow fever is spread by the mosquito, and while it would be going too far to say that this is the only possible method of diffusion, it may be stated that no other has been proven. This fact makes it seem likely that yellow fever is not due to any bacterium but is caused by some protozoa, similar in character to the protozoa causing malaria. The bodies described by the New Orleans investigators would seem to be organisms of this type and while it may not prove to be the true cause of this disease, it appeals to one as probable. No doubt later articles by these men will furnish evidence sufficient to warrant a conclusion.

¹ Münchener Medicinische Wochenschrift, 1905, 119.

² Journal of the American Medical Association, 1905, 2, 915.

DISEASES OF CHILDREN.

By FLOYD M. CRANDALL, M.D.

THERE is a growing tendency on the part of leading pediatric practitioners to rely upon dietetic and hygienic measures in the management of infants. The belief is growing stronger that among children, even more than among adults, success depends upon preserving nutrition and of putting the body in the way to resist disease. These views have recently been expressed by Holt,¹ who believes that dietetics and general hygiene are the two important factors in the treatment of sick children. The nutrition of the child should be kept in a prominent place in the mind of the practitioner. In the treatment of the intestinal disorders Holt believes that the essential factors are evacuants, diet, and rest. In the chronic disorders of older children he believes that a careful dietary is the only treatment which will yield permanent results. In the absence of permanent lesions most other measures are useless. He believes that the neuroses are largely the result of impaired nutrition. Here, as in the acute diseases, an effort should be made to put the body into a condition of resistance. One of the greatest needs in pediatrics to-day is a more intelligent knowledge on the part of practitioners of dietetics and a better understanding of the conditions of health and growth.

The importance of a knowledge of hygiene is made clear by certain studies of Wachenheim² upon the death rate of infants during the summer months. He shows that hot weather alone does not play the chief role in infant mortality, and seems to prove that, in New York, at least, ignorance and neglect are about three times as fatal to infants as hot weather. With proper prophylactic measures the worst summers may be rendered relatively innocuous. Such measures have, unfortunately, not been taken. The mortality in New York City during the summer months has not diminished since 1898. Deaths under five years are 35 per cent. of all deaths. Improvement previous to 1898 is attributed by Ager³ to improvement in the milk supply, to tenement-house regulation, and to greater street cleanliness. He demonstrates the peculiar fact that the death rate of Brooklyn is decidedly higher than that of

¹ New York Medical News, October 7, 1905.

² New York Medical Journal, September 9, 1905

³ New York Medical News, February 4, 1905.

Manhattan; while that of Staten Island, a comparatively sparsely settled region, is still higher. After careful search for the cause of this, he concludes that it is due to the extensive use of condensed milk in Brooklyn. This food is given to over half of the bottle-fed babies of Brooklyn, while in Manhattan only a quarter receive it. Brooklyn and Staten Island have no depots for the distribution of clean, modified milk like those of the Straus depots of Manhattan. It becomes every year more clear that a reduction in the death rate of infants is to be effected vastly more by dietetic and hygienic measures than by treatment. In other words, preventive medicine must be looked to for a reduction of infant mortality.

Sudden Death in Young Children. The causes of sudden death in children are classified by Tubby¹ as follows: 1. Circulatory conditions which may be due to (a) abnormal blood conditions, such as hemorrhages due to hemophilia, pyæmic infection, or infantile scurvy; (b) spontaneous hemorrhage, which includes bleeding from a gastric or duodenal ulcer, and other conditions; (c) postoperative hemorrhage; (d) thrombosis and embolism. 2. Shock may be due to (a) cold, exposure, and undue delay in operating; (b) emptying cavities filled with fluids too rapidly; (c) washing out cavities. The writer dwells particularly upon the danger of irrigation of the pleural cavity, and cites his own experiments upon dogs. 3. Toxic conditions include (a) chemical poisons and irritants. Carbolic acid should never be used as a wet dressing for children. Its local application may cause erythema, vesication, sloughing of the skin or gangrene, or absorption through the delicate skin, resulting in poisoning. Some infants are very susceptible to iodoform, and fatal results have followed its absorption from the bladder. (b) Toxic poisoning includes some cases of unexpected sudden death, occurring several days after operations for appendicitis. Several cases are reported, in all of which the patients were doing well, when they suddenly died. The writer regards these cases as due to development of a poison of an active nature and cumulative effect, and makes no mention of the possibility of embolism. Uræmia may result in unexpected death after operations otherwise safe. 4. Infective conditions. These include development of acute tuberculosis or tuberculous meningitis within a few days after operations upon tuberculous adenitis or bone lesions. Tetanus in the newborn, due to umbilical infection, is now rare. Angina Ludovici and acute malignant œdema, especially after fractures, are causes of sudden death. Pyæmia in children is often rapidly fatal. Tubby has seen death within forty-eight hours following acute necrosis of bone. Umbilical arteritis, lithotomy, and lithotripsy operations are other causes of pyæmia.

¹ British Journal of Children's Diseases, February 5, 1905.

Infection may occur after even a simple operation, as in one cited, in which the operation for adenoids was followed by cervical cellulitis and double empyema. 5. Mechanical conditions include entrance of foreign bodies into the air passages, sudden obstruction by large papillomata of the larynx, pressure upon the trachea or bronchi of tuberculous lymph nodes, bursting of a caseous node into these structures, large thyroid, persistent thymus, and asphyxia, such as occurred in a child whose hands had been tied to prevent handling a wound, and who was found dead, lying with face downward, buried in the pillow. 6. Conditions referable to the nervous system include cerebral hemorrhage during labor, or from hæmophilia; rupture of a cerebral abscess into the lateral ventricles, or of a cerebellar abscess; sudden escape of cerebrospinal fluid, due to opening lateral ventricle in dressing a brain abscess, or due to accidental incision of a spina bifida underlying a nævus. 7. Rare causes are: aspiration of air into the veins during operations for cervical adenitis, acute peritonitis from inflammation of an undescended testis, gonorrhœal salpingitis, and sudden suppuration and rupture of a dermal cyst.

Sclerema Neonatorum. This condition was first described by Uzerberius in 1718. Since that time the term has been used to signify many conditions, and it is only within recent years that most of these conditions have been relegated to other classes of disease, and the term restricted to a certain definite entity. Sobel¹ reports a case and states some interesting facts in connection with the disease. A complete and exhaustive account can be found in the article by Soltmann,² and in a more recent monograph by Friedrich Luithlen.³

A composite description, so to speak, of this affection, as found in the various text-books, states that sclerema neonatorum is a disease occurring at birth, or shortly thereafter, usually in illegitimate, weak, or premature infants, mostly in foundling or lying-in hospitals. It is characterized by a progressive hardening of the skin and subcutaneous tissue, subnormal temperature, increasing asthenia, superficial and weak respiration, collapse, and death. Though occasional mention is made that some cases recover, the general impression prevails that these cases invariably die. In the case reported the history of somewhat premature birth, of its occurrence at birth, or very soon thereafter, in a weak and feeble baby; the existence of firm induration of the skin and subcutaneous tissue, without pitting on pressure; the non-existence of cardiac disease; the inability to raise the skin from the subcutaneous tissue, and both from the deeper parts, all fit in closely with the picture of sclerema neonatorum. The departures in this case from the usual description are: good general

¹ Archives of Pediatrics, April, 1905.

² Encyclopädie der gesanten Heilkunde, 1889, Bd xviii

³ Die Zellgewebsverhartungen der Neugeborenen, Wien, 1902

condition of the patient, recovery, irregular condition of the indurated areas, absence of subnormal temperature at all times during the period of observation, freedom of the calves, and the involvement of the pectoral region.

The most essential features of the treatment were a persistence in the use of warm baths and sweet-oil massage, with the use of mercurial inunctions. Sobel is of the opinion that it was the massage which effected the improvement by stimulating the general circulation, and thereby causing the absorption of the indurated masses.

Congenital Stridor. Several theories have been advanced regarding the pathogenesis of congenital *laryngismus stridulus*. Of these the following are the most rational: (a) congenital malformation of the laryngeal entrance; (b) adenoid vegetations; (c) enlarged bronchial lymph nodes; (d) paralysis of the laryngeal muscles; (e) the thymus theory. Hochsinger¹ strongly upholds the thymus theory. He believes that it is possible to determine the size of the thymus glands during life, both by percussion and radiography. When of normal size the thymus is covered by the sternum, but when it is enlarged the edges extend far beyond the sternum. This enlargement can be determined by percussion. He has examined fifty-eight infants by the radiograph to determine the size of the thymus. In twenty-six of these he found the thymus enlarged, and of these twenty suffered with stridulus breathing. He believes that this stridor is due to compression of the trachea. It is sometimes present at the birth of the child, but usually develops suddenly when the child is a few weeks old. It may continue unchanged for several months and may cause but little discomfort to the child. A fatal result may, however, follow.

Stridulus breathing or actual laryngismus in the newborn is a rare condition, but it occasionally occurs and is the cause of great anxiety. A type of laryngismus, apparently of congenital origin, is described by Cozzolino.² In this type the opening of the larynx is badly formed, particularly the epiglottis, aryepiglottic folds, and rima glottidis. There is a nervous element also in such cases. It is rarely fatal, but when it is so death is due to broncho- or croupous pneumonia, to which the child is predisposed by the malformation of the larynx. It is also to be distinguished from a form that has very similar manifestations, but that is secondary to other nasal, pharyngeal, and bronchial conditions of hypertrophy or inflammation. The characteristics of the secondary spasm are its coming in paroxysms, and its rapid disappearance under treatment for the primary condition. The stridor is different in sound and is accompanied by less cyanosis.

¹ Revue mens. des malad. de l'enf., 1905, vol. xxiii., No. 3.

² Revista di Clin. Ped., July, 1905; American Journal of Obstetrics, October, 1905.

Cephalhæmatoma. Small tumors of this kind require little or no treatment, for they will disappear, as a rule, without complications. They should never be incised. If the hæmatoma be double, or of very large size, De Forest¹ advises the use of a large bonnet lined with cotton, leaving only the face visible. Thick layers of cotton held in place by the "nun's-cap bandage" will afford very satisfactory protection to the tumor. With such protective dressing the child can lie very comfortably upon either side. The author asserts that the absorption of the blood is, as a rule, much more rapid than most of the text-books tell us. Three or four weeks are usually ample for the absorption of a very large hæmatoma. A favorable prognosis can, as a rule, be safely given. In a very few severe cases, or when suppuration has taken place, surgical intervention is required.

Brachial Birth Palsy. An account of extended researches upon this subject is given by Clark, Taylor, and Prout.² They present several new facts in the etiology and pathology of the laceration type of birth palsy, the development of the relation thereto of the symptomatology, and the establishment of a scientific basis for treatment. The cause of the laceration type of birth palsy is pressure on the nerve trunks, which first ruptures the nerve sheaths and then the nerve fibres. The prevention of this serious lesion of the cervical nerve trunks rests with the obstetrician, who should not overstretch the child's neck in the process of delivery. The persistence of the palsy is clearly explained by the pathological findings—viz., (a) rupture of the perineural sheath, with hemorrhage into its substance, resulting in the formation of hæmatomata or hæmatomatous infiltration into the neighboring tissues; (b) the cicatricial contraction following organization of the blood clot and the repair of the rent in the perineural sheath. The connective tissue thus formed indents and presses on the nerve bundles, strangulating them, and preventing regeneration of the nerve fibres. The nature of the condition in all cases demands excision of the damaged areas, and suture of the divided ends as soon as it is proved that spontaneous repair will not take place. The plan of treatment is then the same as for peripheral nerve injuries elsewhere. In all cases such treatment as will prevent contractures and deformities and maintain muscle tone in the paralyzed limb should be systematically used, until either spontaneous recovery occurs or operation is done. The proper time for surgical interference is not as yet definitely fixed. It appears, however, to be much later than two or three months after birth, as advised in Kennedy's report. At the present a year would seem to be sufficient time to wait before operation.

¹ Medical News, September 9, 1905.

² American Journal of the Medical Sciences, October, 1905.

Facial Paralysis of the Newborn. This is usually due to pressure of one blade of the forceps upon one side of the face. The condition is usually trivial, but De Forest¹ calls attention to the fact that a child with such an injury cannot nurse properly, and must be carefully watched lest its nutrition become impaired before its physician is aware. It may be necessary to feed such a child with a bottle or with a spoon, or even by gavage in serious cases. The disease commonly runs a short course, and recovery is rapid. The paralysis usually disappears before the end of the first month.

Hemorrhagic Disease of the Newborn. It is now generally believed that hemorrhagic disease of the newborn is an infectious and self-limited disease. It usually runs a comparatively short course, death or recovery taking place within a few days. Townsend² reports a severe case which terminated in recovery. The first symptom was a slight ecchymosis of one finger. On the following day the baby cried considerably, and vomited some bloody mucus. An ecchymosis appeared under the chin and on the back of the neck. On the third day several more hemorrhagic spots appeared, and when the child was sixty hours old copious bleeding began from the base of the cord at the navel. At the same time it passed a large, tarry stool, made up of decomposed blood, and vomited fresh blood. The temperature was 101°. The child now presented a desperate appearance, and the outlook was the very worst. Nitrate of silver in the solid stick was applied to the bleeding points at the navel, and styptic iron was also used. Both had only a temporary effect, and the blood soon poured out again through the black clots. Continuous pressure with the thumb served to stop the bleeding. A heaping teaspoonful of *gelatin*, dissolved in an ounce and a half of water, was then given to the infant from a bottle, and was eagerly taken, and a 1:1000 solution of adrenalin was applied to the navel. Pressure with the thumb was kept up from time to time. The same amount of gelatin was given twice more, at intervals of two hours. The bleeding from the navel ceased after two hours; no more ecchymotic spots appeared; the bleeding from the nose and the stomach did not recur, and at the end of twelve hours, after several tarry stools, a movement of normal color was passed. Recovery was uninterrupted. How much of the good result can be attributed to the gelatin it is impossible to say, but the prompt recovery after its use is certainly suggestive. The benefit from the local use of adrenalin is also worth noting.

Hemorrhage of syphilitic origin in the newborn is considered by Wilson.³ Syphilitic children with evidence of internal hemorrhage

¹ Medical News, September 9, 1905.

² Boston Medical and Surgical Journal, June 1, 1905.

³ Archives of Pediatrics, January, 1905.

require prompt attention. Every effort should be made to sustain their flagging powers of resistance. Oil baths, alternating with mercurial inunctions, are indicated. For fever the ice-cap is indicated, and in intracranial hemorrhage the latter is directly useful as a local measure. In extensive skin hemorrhages rubbing for the purpose of carrying out inunctions should be omitted. In severe cases of melana peristalsis should not be encouraged. With this in view, the nourishment should be given frequently in small quantities, and dry warmth should be applied to the body.

The following drugs have been used internally: Suprarenal extract, half-grain doses, repeated; adrenalin solution, 1:1000, one drop in repeated doses; gelatin solution; fluid extract of ergot, one-drop doses. Tally, in an interesting case, in which bleeding resulted from a puncture, noted a favorable result from the use of calcium chloride in half-grain doses, given every two hours.

Asphyxia. Three procedures are presented by De Forest¹ as necessary in cases of asphyxia. Clear the air passages from mucus; stimulate the child with heat; perform artificial respiration. If the asphyxia be deep, all three of these procedures are of the utmost importance; to omit one of them may result in failure. The best method to clear the air passages of mucus is to wipe out the child's mouth and clear out the mouth and nose by mouth-to-mouth insufflation through the medium of a towel or layer of surgical gauze. The very act of forcing air through the upper air passages is of itself a valuable aid to establishing respiration. During this procedure care must be taken to press with the thumb firmly upon the baby's stomach, otherwise the child may soon resemble a balloon, by reason of distention of stomach and intestines by the air forced through the œsophagus. The stimulus of heat is most easily applied by placing the child at once in a hot bath. Rhythmic traction of the tongue may also be practised in connection with artificial respiration.

Umbilical Cord Hernia. Hernia at the umbilicus of newborn infants is very common. A more uncommon form of hernia is that into the cord itself. It consists of a projection of a portion of the intestine or even of some of the abdominal organs through an opening at the navel. A tumor is formed, varying in size from that of a nut to that of a newborn infant's head, or larger. It is oval, round, or barrel-shaped, with the cord starting from the distal portion. The hernial sac appears to be composed of the distended umbilical cord. Its walls consist of peritoneum and of the amnion of the cord alone, and are grayish-white and translucent. The contents are usually coils of intestine, but sometimes all or a part of

¹ Medical News, September 9, 1905.

the liver, stomach, spleen, or other organs may be found in it. The color of these is distinguishable through the walls of the sac. The size and tension of the mass increase with crying or coughing. The hernia can sometimes be reduced and sometimes not.

When it is of small size recovery may take place spontaneously with the removal of the cord. A reactive inflammation then takes place around the ring-shaped border of the hernia. The color of the hernial sac changes, the umbilical cord shrinks, and finally it and the amnion separate. Granulations then spread gradually over the space remaining, generally with free suppuration. As the wound thus left heals and shrinks, the hernia disappears within the abdominal cavity. A cicatrix remains, but no real umbilicus. Many dangers, however, attend this process, and a fatal issue generally results. The peritoneum is very liable to invasion; the hernia becomes gangrenous, or general sepsis develops. The prognosis is on the whole grave. By far the greater proportion of cases died until the radical operation was introduced and perfected. Even thus, the mortality is large. In cases of very large hernias, with the presence in the sac of a considerable portion of the abdominal contents, the child is scarcely able to live. Sometimes the sac breaks during birth, leaving the child partly eviscerated. Very often the child exhibits other malformations, some of which are incompatible with life. Not infrequently the infants are premature or stillborn. The diagnosis is easy, except in the case of small cylindrical hernias into the cord. Here it is easy to overlook the condition and apply a ligature, which, of course, ligates the intestine as well.

Every child, born with that portion of the cord which joins the body considerably swollen, should be examined very carefully before a ligature is applied.

The treatment consists, first of all, in the greatest care in handling the congenital hernia, and in the use of every possible antiseptic precaution. If the hernia is small, and if reduction can be made quite easily, this may be done, and an antiseptic compress applied and held in place with adhesive plaster. The child must not be lifted into an upright position until the wound has completely cicatrized, and this may not be for weeks. If the hernia is not reducible it may be covered with an antiseptic protective dressing, in the hope that granulations may form and the process go on as just described. A much more successful plan of treatment, however, applicable also to the small reducible hernias, is the doing of a radical operation as soon after birth as possible, and without any previous effort at reduction being made. The operation may be done either without the opening of the peritoneum or with it. After the operation the temperature of the child should be maintained, preferably in an incubator. Many infants have been saved by this operation.

Premature Infants. Morse¹ asserts that there are very few authentic cases of the survival of infants before the twenty-eighth week. Very few survive if the weight is under two pounds or the length less than thirteen inches. Except for medicolegal purposes, however, the age and weight are of little importance, for an attempt should be made to save every case. It is an error to regard the premature baby simply as a small baby. It is an undeveloped baby, and is not ready to live and struggle against the abnormal conditions in which it is placed. It is compelled to breathe air into lungs but partly ready for use, and to use digestive organs but partially completed. In short, the baby is not prepared for independent existence. On account of the relatively large surface exposed to the air, and their small heat-producing capacity, premature infants require relatively more food and far more protection from cold than do normal infants.

The two most important points in the care of premature infants are the maintenance of the animal heat and the provision of a suitable food. It is unquestionably of advantage to protect them from noises, bright lights, and handling, because in this way the normal intrauterine conditions are more nearly approached, but the importance of all these measures is infinitely less than the maintenance of the animal heat and the provision of a suitable food. Premature babies must be left alone and not handled. While attempting to keep up the infant's heat, it must not be forgotten that both fresh air and pure air are necessary for its well-being. It cannot thrive on air that has lost its oxygen, and it will be infected by bacteria-laden air even if it is kept warm. There are two means by use of which the animal heat may be kept up. These are incubators and substitutes for incubators. The ideal incubator, Morse believes, has not been constructed. Most of them can be made to maintain a constant temperature, but none of them provides a sufficient supply of pure, fresh, warm air.

The best and most available substitute for the incubator is the padded crib or basket. If a crib is used, it must be a small one, and it must be padded thickly with cotton. The top should be covered with a blanket which reaches to a little below the baby's neck. The temperature of the immediate surroundings can be maintained by the judicious use of hot-water bags or bottles, and should be between 95° and 90 F°. The temperature should be taken from a thermometer wrapped in the baby's clothing, and not from one hung in the crib. The child should not be bathed, not even at birth. It should be oiled with olive oil then and every two or three days afterward. This gradually cleans it and keeps the skin in good condition. It should be oiled in its crib, not in the nurse's lap. It should not be dressed, but should be wrapped in absorbent cotton, or, better, in a quilted gown with a hood. The gown is made by quilting cotton

¹ American Journal of Obstetrics, May, 1905.

between two layers of cheesecloth. This protects the baby as well as cotton alone, and makes the care much easier. A diaper may be used.

The most suitable food, if breast milk cannot be obtained, is some modification of cows' milk. Whey mixtures are better than ordinary mixtures, because the proteids are in a more easily digested form, and hence throw less work on the feeble digestive organs. Very weak mixtures should be used at first. If too strong a mixture is given in the beginning it may kill the baby, and will certainly cause digestive disturbances, which will require days or weeks to correct. It is never a mistake to give too weak a mixture in the beginning, even if for a time it has to be strengthened every day or two.

It is rarely advisable to feed a premature infant as often as once an hour, as this gives it almost no time for rest or sleep. The best interval in the beginning is usually one and one-half hours. The food should be given at this interval both day and night, making sixteen feedings. This interval should be lengthened to two hours as soon as possible. Feeding should be commenced within a few hours after birth.

The prognosis depends chiefly upon the age of the infant. There is, of course, nothing in the old saying that seven months' babies are more likely to survive than eight months' babies. It probably originated in the fact that seven months' babies were given special care, while eight months' babies were treated in the same way as those born at full term. The prognosis is almost absolutely bad when the weight is under two pounds. It is very fair when it is over four pounds. Every ounce of weight over two pounds increases the chances of survival. Premature infants that are doing well usually have a slightly elevated temperature; those that are doing badly almost always a subnormal temperature. A drop in the temperature should always be regarded as a sign of danger, even if all other conditions seem favorable. Premature infants that are apparently doing well in other ways often go many weeks without any gain in weight. We should be satisfied for the time if we develop a normal baby. Premature babies are very apt to die suddenly without any apparent cause, and it is never safe to consider them out of danger until they are thriving under normal conditions. Up to this time the prognosis should always be guarded. If they survive they become as vigorous and as large adults as do full-term babies.

Sherman¹ reports experiences with twenty-nine premature infants treated in the Children's Hospital of Buffalo. Feeding was begun promptly, food being given every hour during the day for the first two weeks. Breast milk was used if it could be obtained. It is frequently best to reduce it with an equal amount of water and add 1 or 2 per cent.

¹ New York Medical Journal, August 5, 1905.

of sugar of milk. Sherman's mortality rates were as follows: Saved at six months, none; at six and one-half months, 75 per cent.; at seven months, 50 per cent.; at seven and one-half months, 66 per cent.; at eight and one-half months, 100 per cent. Percentage saved according to weight: Under 2 pounds, none; 2 to 2½ pounds, 25 per cent.; 2½ to 3 pounds, 50 per cent.; 3 to 3½ pounds, 42.8 per cent.; 3½ to 4 pounds, 50 per cent.; 4 to 4½ pounds, 75 per cent.

Terrion¹ also urges strongly the importance of using breast milk for feeding these children. He also emphasizes the fact that maintaining the heat and fresh air are as important as the diet.

Recurrent Vomiting. This distressing condition, sometimes known as *cyclic vomiting*, is the subject of an excellent paper by Rachford.² It is a symptom-complex closely related to migraine, autotoxic in origin, and characterized by recurrent attacks of nausea, persistent vomiting, and great prostration. In the interval, as a rule, there is no digestive disturbance, and the child may appear well and happy. In the treatment of these cases, if seen in the prodromal stage, Rachford prescribes ¼ grain of calomel and 5 grains of soda every two or three hours. No food is given until the child is able to retain small quantities of water. When nothing can be retained, it is well to administer at intervals of every eight to twelve hours a high rectal enema of bicarbonate of soda solution, a tablespoonful to a pint of water. In the worst cases, in which prostration is extreme and stimulation strongly indicated, sterile physiological salt solution may be injected into the subcutaneous tissues. Morphine, hypodermically, is occasionally necessary as a life-saving measure. Small doses of from $\frac{1}{10}$ to $\frac{1}{20}$ of a grain are usually sufficient. With regard to curative treatment, an out-door life, with moderate exercise, is the most beneficial measure. The medical, dietetic, and general treatment is, however, of the first importance. Children subject to recurrent vomiting should leave school and live quietly, avoiding every form of mental and physical fatigue for years. The diet should be carefully restricted and selected. At first all raw fruits, acid vegetables, tea, coffee, beef-juice, beef-tea, and alcohol should be avoided, and beef and sweets should be partaken of sparingly. Milk, cocoa, vegetable soups, cereals, well-cooked vegetables, cooked fruits, eggs, fish, chicken, mutton, and occasionally beef may be allowed. As such children between the attacks have, as a rule, abnormal appetites, they must not be permitted to take an excess of food, and should cultivate the habit of drinking water between meals. Enemata are not indicated, but abdominal massage will sometimes relieve the constipation. In the case of weakly children who are not able to lead an out-door life, moderate exercise, with general

¹ La Presse Médicale, July 22, 1905.

² Archives of Pediatrics, December, 1904.

massage is a valuable remedy. In the medical treatment of this condition, however, the wintergreen salicylate of soda and the benzoate of soda, put up in a palatable solution in a dose to suit the age of the child, are the remedies upon which the greatest dependence may be placed.

The use of large doses of bicarbonate of soda has been strongly urged during the past two or three years in the treatment of these cases. It is a well-established fact that the urine is usually loaded with uric acid and urates, while acetone and diacetic acid are commonly, and perhaps always, present. Numerous cases have been reported in which decided relief has been afforded by the alkaline treatment. I have recently secured a brilliant and most satisfactory result in a severe case of recurrent vomiting by the use of 15 grains of bicarbonate of soda administered every two hours from the beginning of the prodromal symptoms. In some cases the soda solution is not retained. This is particularly true if its administration has been delayed until the later stages and the vomiting has become severe.

Rickets. During the past year little or nothing has been written upon this subject, which usually receives much attention from medical men. A case of rachitic fractures of the femora is reported by La Fetra.¹ When first seen the child was twenty-one months old. It could not walk, stand, nor sit up without support. Rachitic symptoms were present, and there was also hyperplasia of the inguinal and epitrochlear glands. There was an angular deformity of the femora, with convexity outward, with some swelling and tenderness of the middle shaft of the femora. Syphilis and scurvy were excluded. The tenderness was at the middle of the femora, and not at the epiphysis. No attempt was made to correct the deformity when first seen, because of the bad condition of the child. The deformity was quite misleading, as it closely resembled the simple antero-external deformity of rickets without fracture. Had it not been for the discovery of the tenderness over the seat of the fracture, in all probability the diagnosis would not have been made. The radiograph showed a green-stick fracture in each femur at about the middle of the shaft.

Chondrodystrophy. The essential process in this condition, according to Miller,² is defective growth of proliferating cartilage cells. Only those bones which are formed during the early fetal stage are affected. Those bones formed in membrane and those formed in cartilage, which do not ossify before birth, are not involved. Of the etiology practically nothing is known. The characteristic features of the disease are a normal trunk; large head, with depressed bridge of nose; deformed and shortened ex-

¹ Archives of Pediatrics, February, 1905,

² American Journal of the Medical Sciences, July, 1905.

tremities; short, fat fingers of equal length, with characteristic separation of the middle and ring fingers; and marked lordosis.

A very interesting paper is presented by Charles Herrman¹ upon the differential diagnosis of chondrodystrophy—*rickets*, *sporadic cretinism*, and *mongolism*. All these conditions have certain features in common, though clinically and pathologically they are widely different. We have here a striking illustration how different causes acting in different ways may produce similar results. Differential diagnosis is not only of scientific interest, but also of great importance, for upon a correct diagnosis depends prognosis and treatment which is entirely different in each of these affections. Space forbids a review of the many differential points presented by Herrman, which he makes more clear by copious illustration.

Marasmus. One of the most thorough studies made upon this subject for many years is that of Wentworth.² He reviews the various theories which have been held regarding the causation of this condition, and concludes that very few positive statements can be made. In fact, all that can be said with certainty is that marasmus is a functional impairment, but it cannot be stated what functions are impaired. It is certain that improper feeding is at the root of the trouble. Proper feeding will do much to overcome the difficulty, if it is not too far advanced; but proper feeding is often extremely difficult to attain. Artificial foods of all kinds are faulty. Cows' milk, even when properly modified, is often unsatisfactory. In all cases, except the more simple ones, a wet nurse is necessary to success as breast milk is the only food that most of these babies can thrive upon. With proper food marasmic babies are as capable of gaining in weight as are normal babies. When the child is well started it is often possible to return to cows' milk, if such a course seems desirable. Wentworth asserts that, although metabolism observations have established several important facts, he has not been able to discover the causes. It is clear that the causes of marasmus are not to be discovered by metabolism observation. Other lines of research are necessary.

An extended article upon fat in relation to the production of marasmus is contributed by Heinrich Stern.³ He believes that the condition is due largely to the fatty content of the food. The chemical character of the fat, as well as its quantity, must be taken into consideration. He asserts that the composition of the fat of cows' milk is greatly at variance with the composition of the fat of human milk, differing especially in its far greater content of volatile fatty acids, among which butyric acid is the

¹ Archives of Pediatrics, July, 1905.

² Journal of the American Medical Association, August 6, 1905

³ Archives of Pediatrics, June, 1905

most important. Butyric acid is the mother-substance of the acetone bodies, to the presence of which a number of disorders to which the infant is prone are now ascribed. Butyric, caproic, caprylic, and capric acids are contained in the fat of cows' milk in from six to eight times the amount in which they are present in human milk. Stern believes that yolk fat is the ideal fat for infants suffering from chronic gastrointestinal disturbance. It should not be employed in the newborn, nor in the infant which thrives on the physiological nutriment or on a modification of cows' milk. There are two essentials which must be followed for good results from the ingestion of yolks—viz., the yolk fat must completely replace the milk fat, and the amount of yolk fat, without being in excess, must be adequate. The yolk fat must be combined with skimmed milk.

In discussing this paper, Southworth¹ said that he was not so pessimistic regarding marasmus. He saw distinctly less of these cases to-day than formerly, and believed that it was due to a better milk supply in New York. He had never thought that fat was a causative factor in the production of marasmus. Sometimes one sees cases of marasmus due to too strong milk mixtures. It is produced, perhaps, by too frequent use of proprietary foods which are notoriously deficient in fat. The theory that fat is an active agent in the causation of marasmus is a new one. We should be open minded, and consider it before passing final judgment upon it. It is sometimes difficult to get children to take the yolk of eggs, as it causes gastric disturbance and vomiting.

Edsall and Miller² report some interesting observations upon the use of *predigested legume flour*. This flour contains a very large percentage of proteid, and if digested and absorbed would seem to be a valuable addition to our means of managing cases of impaired nutrition. Bean flour and other legume flours have for many years past occasionally been used by members of the profession, as well as by the laity, in feeding infants. Relatively little attention has been paid to this, however, and there has been no investigation of the actual suitability of such foods for infants. Unless predigested, they must be difficult of digestion, and it is impossible to give more than a very small quantity. The present study was undertaken for the purpose of determining by actual observations to what extent predigested bean flour can be successfully given to infants, and how far it may be possible to use the nitrogenous constituents of bean flour in place of milk proteids. It would seem to be readily possible to introduce as much as 1 per cent. of proteid from this source into a baby's food, and, if necessary, even much more. The number of cases upon which these observations were made was not large,

¹ Archives of Pediatrics, July, 1905.

² Ibid., October, 1905

but, so far as they went, the results seemed extremely encouraging as compared with those obtained by other methods of feeding atropic babies in hospitals.

Infant Foods. The first of the artificial infant foods to be considered is cows' milk. Until quite recently we have been quite dependent for our data relating to the composition of cows' milk upon analyses published in European countries. Within the past few years there has been accumulated by the work of the Agricultural Experiment Stations of the United States an enormous amount of material dealing with the composition of milk. The work thus done has not been of a haphazard or desultory character, but a full knowledge of the character of the milk analyzed has been furnished. According to Van Slyke,¹ chemist of the New York Agricultural Experiment Station, who contributes an admirable paper upon the chemistry of cows' milk, the knowledge furnished by these American investigations impresses one with the following facts: First, analyses of milk furnish little real information, unless we know something of the history of the samples; second, analyses made in other countries may have little or no value when applied to milk in the United States; third, and statement of so-called average composition of milk is misleading, because normal cows' milk varies so much in composition. Many averages that have been published are misleading and absurd.

He considers in detail the various elements which occur in cows' milk. The highest percentage of fat is derived from Jersey cattle, in which the average is 5.60 per cent. The strength in fat ranges in order through the Guernsey, Devon, Short-horn, Ayrshire, and Holstein, the latter averaging 3.36 per cent. The milk becomes less rich in fat every year of the cows' life after the second. It diminishes very slightly month after month during the first five months of lactation, and then slowly increases. The milk first drawn at a milking contains very little fat, but that last drawn is very rich.

The writer considers the nitrogen compounds of milk in considerable detail. He believes that there are not more than four nitrogen-containing or proteid bodies; and these are casein, albumin, globulin, and galactase. Globulin and galactase are present in so small quantities that we may regard casein and albumin as being essentially the nitrogen compounds of milk.

Casein is the most important proteid in milk because it is the one present in largest quantity; its presence makes it possible to convert milk into cheese, and it has high value as food. Milk casein exists in milk not in solution, but in the form of extremely minute, solid, gelatinous particles in suspension. The slime found in the bottom of cream separators consists largely of milk casein. Casein is a very complex chemical

¹ Archives of Pediatrics, July, 1905.

compound, containing the elements of carbon, hydrogen, nitrogen, sulphur, and phosphorus. In milk the proteid molecule of casein is combined with calcium; hence the proper chemical name of milk casein is calcium casein. Milk albumin differs from milk casein in many ways. Milk albumin is not acted upon by rennet; it is not coagulated by acids at ordinary temperatures; it is coagulated by heat alone. The general statement is prominently current in literature to the effect that casein and albumin are present in milk in very constant relative proportions, the amount of calcium casein being five times that of albumin. The writer has studied this question with a great variety of milk taken from both herds and individuals. He has found that calcium casein and albumin vary greatly in their quantitative relations to each other. Taking the amount of albumin as one, calcium casein varies all the way from 2.6 to 5.6, the averages being about 3.6 parts of casein to 1 of albumin.

An examination of many individual analyses of milk, especially of analyses given by German, French, and English authorities, would make it appear that milk usually contains about as much casein and albumin as fat, and in some cases more. In 5500 samples of American milks, with a fat content of between 3 and 5 per cent., the fat averaged 3.92 per cent. and the nitrogen compounds 3.20 per cent., or a ratio of 1 part of nitrogen to 1.225 parts of fat. This relation has a value in enabling us to identify milk that has been skimmed in any marked degree. When the percentage of fat drops below that of nitrogen compounds the milk may be confidently regarded as skimmed, especially in the case of milk from herds. One cannot fail in studying the data that have been presented in relation to the composition of normal milk of cows to realize that normal milk is very variable in composition. In modifying the composition of milk for use of infants or invalids, the only way that is really certain is to know the content of fat and proteid in the particular sample of milk that one is going to use. The determination of fat is entirely practicable by the use of a small Babcock tester, which can be obtained at any chemical supply house. Having obtained the percentage of fat, the following figures will serve as an approximate guide to the amount of casein and albumin in the milk.

Fat in normal milk.	Casein and albumin.
3.0 per cent	2.90 per cent.
3.5 "	3.10 "
4.0 "	3.30 "
4.5 "	3.50 "
5.0 "	3.65 "
5.5 "	3.80 "
6.0 "	3.95 "

A study of the fat of top milks is reported by England and La Wall.¹ The variation in the fat of the extreme upper layer ranged between 60

¹ Journal of the American Medical Association, September 23, 1905.

per cent. and 170 per cent. The difference in the fat of top milk in pint bottles and quart bottles are very marked. Their observations confirm a fact that has been long known, that the most uniform milk is derived from a herd, and not from a single cow.

Observations are reported by Evans and Cope¹ to determine the inhibitory action of unheated milk upon bacteria. The conclusions to be drawn from these experiments are: that unheated milk does possess a slight inhibitory action to the varieties of organisms used (this action at incubator temperature lasts from four to eight hours); that physical changes in milk have a direct relation to the number and variety of bacteria present; that the antagonism of one variety of micro-organisms toward another must be considered in drawing conclusions from experiments made with milk containing the mixed bacterial flora.

A new method of preserving milk by means of high pressure of carbonic gas is described by Spolverini and Flamini.² The application of this method of preservation, they assert, is simple in practice; its results are excellent and aid in solving the problem of feeding infants with uncooked milk. The preservation of milk with peroxide of hydrogen is advocated by Baumann.³ If added in amounts of 0.35 per mille, the milk will keep for many days and the number of germs present will actually decrease to a very low number. When pathogenic germs, such as typhoid, cholera, dysentery, or tuberculosis, were added to the milk they could not again be detected after the most searching bacteriological examination. It is proper to say that this is not a new method of preserving milk, and is not free from serious drawbacks.

Some important studies are reported by Pennington and McClintock⁴ upon the keeping qualities of *pasteurized and raw milk*, as obtained in Philadelphia. The criticism has frequently been made that unless every detail of pasteurization is carefully carried out the milk is not rendered any safer. These observations would seem to show that there is some truth in this statement. Where milk is intended for the young or sick, and pasteurization must be resorted to, it should certainly be done after the milk is bottled, and every precaution be taken against contamination after heating. When a milk before pasteurization shows a count of more than 1,000,000 organisms, the question arises, is it desirable to permit in a food the toxins and products of metabolism of these many generations of organisms, even though they themselves be reduced to a few hundred thousand at the expense frequently of the milk enzymes, and probably of other substances closely connected with its food value and keeping

¹ Archives of Pediatrics, August, 1905.

² Revista di Clin. Ped., July, 1905; American Journal of Obstetrics, October, 1905.

³ Münchener med. Wochenschrift, June 6, 1905.

⁴ American Journal of the Medical Sciences, July, 1905.

qualities? Counts of clean (certified) milk and of commercial pasteurized milk showed that the latter was richer in organisms on the initial examination, and that a rapid increase in the organisms present took place on keeping, even at refrigerator temperatures. Pasteurized, modified milk for infant feeding showed frequently an appalling initial count, and almost invariably a very high count at the end of twenty-four hours. The commercial pasteurizing plants succeed in reducing the original bacterial content of the milk to a very low figure in the heating coils, but again contaminate it in cooling and bottling the milk, so that sometimes the final count is higher than that of the original unpasteurized milk.

An application of the *percentage principle of gruel feeding* is attempted by Chapin¹ in making what he denominates standardized gruels. For many years gruels have been used empirically for their known beneficial results as a diluent of cows' milk for infant feeding. It is now recognized that they have other values than those of attenuants of the curd of cows' milk. They may often be employed to economize the energy of the body that is being used in the effort to prepare food for assimilation. By taking advantage of this fact, it is often possible to keep the body well nourished on a quantity of food that is much smaller than is theoretically indicated. For the purpose of establishing standards, Chapin had a number of different kinds of gruels made, and then had them assayed. The analyses were made at the New York Agricultural Experiment Station by Director W. H. Jordani, with the following results:

	Total solids, per cent.	Proteids, per cent
1 ounce Av. pearl barley to quart (32 ounces)	1.483	0.140
1 ounce Av. prepared flour to quart (32 ounces)	2.288	0.195
1 ounce Av. wheat flour to quart (32 ounces)	2.494	0.331
1 ounce Av. rolled oats to quart (32 ounces)	1.931	0.262

The composition of gruels made with six ounces of cereal to the quart gave almost exactly six times the composition of the gruels made with one ounce to the quart. If a definite weight of cereal is used, and none is removed by straining, the composition of any gruel can be calculated by dividing the composition of the cereal by the number of times it is diluted. Plain gruels cannot be made much stronger than two ounces to the quart. Dextrinized gruels may be made up as high as eight ounces to the quart. The high proteid gruels are of great value in many conditions. The author has employed them in cases of persistent vomiting in patients of all ages. There is a widespread erroneous belief that vegetable proteids are not good tissue builders and are not readily digested. Recent studies have shown that as high as 98 per cent. of the proteid of white bread is digested by men. The proteid of oatmeal is as thoroughly digested as meat, if it has been separated from the fibre.

¹ Archives of Pediatrics, March, 1905.

Cereals in the form of well-cooked gruels have the cellulose ruptured, and so expose the proteids that they may be readily acted upon by the digestive enzymes.

Breast Feeding. In a series of editorial articles¹ the editor discusses the decadence of lactation. He is not as pessimistic as are many writers upon the subject, for he does not believe it an unmixed evil. He calls attention to the fact that lactation is an undoubted drain upon the mother, and that the types which can lessen this vital expense will survive in the long run. Nursing must be encouraged, as we are far from producing a perfect artificial food. If all that is now known of infant feeding were forgotten, infant mortality would jump again to what it was in savage life, and the race would perish. Hence advances in knowledge of means of inducing lactation for as long as possible, and then of feeding the child later, are the present necessities.

The influence of feeding upon infant mortality has been investigated by Howarth.² His studies were made upon 8348 cases. The death-rate was by far the highest among the artificially fed children, being in the proportion of 197.5 to 1000, as compared with 69.8 among breast-fed children. Among the artificially fed diarrhoeal diseases and defective nutrition prevailed. Among the breast-fed bronchitis and pneumonia were the most common causes of death. Children fed on condensed milk presented a very high mortality, the rate being 255 per 1000 children. The death rate among children reared on patent foods was also higher than among those fed on cows' milk. Extensive observations were made upon 11,000 infants at the Maternity Hospital in Stuttgart.³ It was found that in many cases inability to nurse was not real, but apparent. Fully 98 per cent. of the mothers were able to nurse their children when the proper measures were taken. Of the breast-fed children 40.9 per cent. reached their birth weight on the eighth day and 54.8 per cent. on the thirteenth day of the puerperium; while 25.4 per cent. of the bottle babies only reached their birth weight on the eighth day and 35.6 per cent. on the thirteenth day.

The influence on the infant of an excess of fat in the mother's milk is discussed by Planchon.⁴ The chief digestive disturbances are vomiting and diarrhoea. They usually develop gradually, and become serious if the condition is not remedied. Treatment of the mother consists in exercise and reducing meat and alcoholic drinks.

Some excellent advice regarding weaning from the breast has recently been issued in the form of a circular.⁵ When the milk is insufficient in

¹ American Medicine, July 22, 1905.

² Lancet, July 23, 1905.

³ Archiv f. Gynecologie, 1905, Bd. lxxiv., No. 3.

⁴ La bulletin médical, May 6, 1905.

⁵ Circular of the Illinois State Board of Health.

quantity it is best to aid the mother by giving the baby some artificial food. This should be done, if possible, prior to the beginning of weaning. Good artificial feeding is better than bad breast feeding; but one should be very certain that the breast feeding cannot be improved. Artificial feeding should be begun promptly when it has been shown by two or three previous experiences, under favorable conditions, that the mother cannot nurse the child. Breast feeding should be discontinued under the following conditions: (1) When the mother is a consumptive. Not only is there danger to the child in nursing, but the drain to the mother herself hastens the progress and fatal termination of the disease. (2) When serious complications follow childbirth, such as hemorrhage, blood poisoning, or kidney disease. (3) When the mother is epileptic or suffers from cancer, or is so intensely nervous as to require medical attention. (4) When the mother suffers from any chronic disease or is very delicate. Nursing under such conditions is too severe a drain upon the mother, and is usually unsatisfactory for the child. (5) When the mother has become again pregnant.

Extreme sensitiveness of the breast is not a reason for discontinuing nursing. Persistence for a few days usually overcomes this sensitiveness. Menstruation of the mother does not affect the milk as much as is usually believed. It may at times cause slight indigestion, but is not a sound reason for discontinuing nursing.

Infant Feeding. Various methods of modifying or adapting cows' milk for the use of infants have been advocated by different authorities. The question necessarily arises in the mind of the practitioner, which principle is the correct one. Many of these methods differ widely, and it is certain that they cannot all be correct. It seems at least certain that they cannot all be equally efficacious. Pisek¹ has made an admirable attempt to classify these various methods of modifying cows' milk for infant feeding. Before making this classification he outlines briefly the peculiar processes of infant digestion and development. Lack of appreciation of these peculiarities has led to much error in infant feeding. Young suckling animals at birth are not like chickens when hatched, little adults which simply enlarge to become adults. They develop new functions during the suckling period, and are gradually changing both their form and functions until the natural period of weaning, after which growth consists principally of enlargement. The anatomy of a young mammal is not the same as that of the adult. Especially is this so in the case of the digestive tract. Teeth are absent and the stomach is not like that of the adult, or proportional quantities of adult food could be eaten and digested. It is evident, therefore, that the physiology of adult

¹ Medical Record, September 9, 1905.

life does not apply to developing animals, and that milk must be a food which is peculiarly suited to the developing stomach, or it would not be supplied. There must be something about milk that is different from ordinary food that makes it particularly suitable for the developing young. During the suckling period the digestive tract develops and changes in its functions, so that when weaning takes place the young are fitted to digest food natural to the species. Aside from the colostrum of the first week after birth milk is supplied by the mother which has practically the same composition during the whole lactation period. Here, then, is apparently a peculiar state of affairs. The stomach of the young animal constantly growing stronger, and still being supplied with the food that was suitable for the very weak stomach of the first few weeks of life. Organs and muscles are increased in size and strength by greater use and not by continually lessening their work.

Mother's milk does not undergo any change in character as the young develop. This should suggest that possibly as the stomach develops it changes the milk so as to make it suitable for its altered form and function. As a matter of fact, the stomach functions do change the milk before it is digested, building it up into solid compounds or curds, whose character depends on the kind of digestive juice that is secreted. If the stomach never received any solid food until weaning it would be poorly prepared for this kind of nourishment; but if it had been having milk changed into a solid which gradually became more difficult of digestion as the digestive secretions became stronger, how easily the stomach could take care of solid food as it was gradually added to the diet. Instead of the solid food coming as a shock, it would be only a little more difficult of digestion than milk, and the stomach would hardly notice the change. A large factor in feeding is gradually changing the diet and avoiding sudden changes in the character of the food. At first the mammary glands secrete colostrum whose proteids are principally soluble. Colostrum is gradually replaced by milk which has its proteids, or a part at least, in the form of casein combined with calcium or lime, which forms curds in the stomach.

After the milk flow is established the character of the milk does not change to all intents and purposes. The stomach of the young animal first secretes rennet ferment, which changes the casein and lime compound into a paracasein compound (junket curd), which is unaffected by pepsin. When a small quantity of acid is secreted it combines with some of the lime of this paracasein compound, and forms a free paracasein curd that is digestible by pepsin. Free paracasein curd is denser than the precipitated paracasein curd in combination with lime, which is produced by rennet alone. In the presence of more acid the free paracasein acts as a base which combines with the acid to form chloride of paracasein.

which is also digestible by pepsin. Thus it is that the stomach secretions may form three distinct solid compounds, with the casein of the milk having different forms and digestive properties, depending on the strength of the secretions. Milk, it will be seen then, is a peculiar food that changes its physical form upon contact with the digestive secretions before digestion commences, for the purpose of supplying the stomach with a food of increasing density.

Each milk obtained from a different species of animals will form a curd peculiar to itself. As the stomachs of young animals imperceptibly pass into the form and develop functions of the adult stomach while digesting mother's milk, it is evident that the mother's milk must be digested very much as the maternal food is digested. As the stomachs of animals show such marked differences of form and methods of digesting food, it is not at all surprising that the milks of animals with widely differing methods of digestion should show wide differences in properties. The problem of the infant feeder in modifying milk, then, is like that of the dressmaker in making over an old dress. It is not like making up a piece of new goods. A great deal of ingenuity often must be employed to make a fit, but many of the methods of feeding pay no attention to either style or fit. With this knowledge of the constructive effects of the digestive secretions on milk, it will be easy to grasp the following classification of methods of modifying milk:

Group 1. Methods that affect only the quantitative composition of cows' milk: (a) simple dilution with water; (b) dilution plus fat plus sugar; (c) removal of part of the casein (whey and cream mixtures).

The food of animals is composed of proteid, mineral matter, and water, forming the blood and tissue builders, and fats and carbohydrates, forming the energy foods. These food elements are all in complete foods in one form or another, and of course in milk. The proportions in which they exist are in direct proportion to the rapidity of growth of the young animal, rapidly growing animals naturally needing more of the blood and tissue building elements than slowly growing animals. To insure proper growth and development the infant needs as much tissue and energy foods as are found in human milk. They are supplied in human and cows' milk in about the following proportions. The energy foods exist in cows' milk in about the same proportions as in human milk, but the tissue builders are in larger quantities in cows' milk, as the calf grows more rapidly than the infant. It is the proteid of the cows' milk that forms the curds in the stomach, and to reduce the amount of curd in the stomach the milk is diluted. This is often done as a chemical measure without any scientific reason. When the milk of the cow is diluted to reduce the proteid, the energy food, fats, and carbohydrates are reduced to below the quantities supplied in breast milk.

The effect of this method is that proteid which is difficult of digestion and should be used for growth is called upon to supply the energy that is needed by the infant, and is used as fuel. The result is that the infant does not gain in weight and strength as it should, even when it is taking as much proteid as is supplied in human milk. When fat or diluted cream and sugar are added to diluted cows' milk they can supply energy and allow the proteid to be used in making new blood and tissue. Growth may thus result on a dilution of milk that would be a starvation diet without the addition of cream and sugar. As any excess of body food is converted into body fat, it is found that an infant fed liberal quantities of sugar and moderate amounts of fat will gain rapidly in weight and apparently grow, even if the quantity of proteid is very low. Thus gain in weight may be made even if the infant is receiving a much smaller quantity of proteid than is found in human milk.

Since a large part of the difficulty in feeding infants with cows' milk lies in the inability of the infants to digest the proteid or curd of the milk, and as apparent growth can be made on fats and sugars, it is taught that the quantity of proteid in the infant's food should be greatly reduced. As a large excess of the energy foods above the actual requirements of the infant is generally fed with the low proteid, this is converted into body fat and the infant gains in weight. It is supposed to be growing, but in reality is being stunted and deprived of its natural rights, for true growth cannot take place without sufficient supply of proteid and mineral matter for the bones. Fats and carbohydrates are not converted into vital tissue, and an infant receiving only one-half as much food as a breast-fed baby can not become as well developed. The laying on of fat masks the lack of tissue development. The illustration and comparative weights from animals fed in this manner show the effect on the body development of feeding small quantities of tissue food with large quantities of energy foods. All of the organs are stunted, the chest is contracted, and there is a small amount of blood in the body. The bones are also weak in animals fed low proteids.

Nutrition experiments of this character have been conducted continuously for about ten years, with the same results everywhere. W. A. Henry gives the following comparative results of high and low proteid feeding, reduced to a base of equal weight:

	Blood per 100 lbs. weight.	Liver per 100 lbs. weight.	Muscular tissue.	Strength of bone.
Low proteid diet	36.8 ounces	31.9 ounces	1.00	380
High proteid diet	51.2 ounces	48.4 ounces	1.33	503

As the curds of cows' milk which has been diluted often cause indigestion, it has been proposed to remove the casein from which the curds are formed by the rennet ferment of the infant's stomach and feed the

remaining soluble whey with more or less quantities of the casein. As the casein was placed in milk for the specific purpose of supplying the solid food for the growing stomach, its removal, except temporarily, cannot be looked upon as a rational method of preparing food.

Group 2. Methods that prevent or alter the formation of curds by inhibiting rennet action: (a) addition of lime-water until slightly alkaline; (b) addition of carbonate of potassium until slightly alkaline; (c) addition of borax until slightly alkaline.

It has been generally believed that one of the greatest differences between human milk and cows' milk is that cows' milk is acid and human milk is alkaline in its reaction, and that some alkali should be added to cows' milk to make it like human milk. When both milks are tested with litmus paper a great variety of results may be obtained. Varying grades of litmus paper will show the same milks to have all kinds of reactions, so that a more delicate reagent—phenolphthalein—is used to determine the reaction of milks. With this test it is found that both kinds are decidedly acid. Lactic acid is not the only compound in milk that reduces the alkali. It is well known that strictly fresh milk which contains no lactic acid neutralizes an appreciable amount of alkali. The compounds in fresh milk or cream that have the power of neutralizing alkali are the following: (a) calcium casein; (b) acid phosphates and citrates; (c) and carbon dioxide. Of these the calcium casein and acid phosphates appear to be the most prominent in neutralizing alkali.

Human milk requires 10 to 20 per cent. of lime-water to neutralize it, and cows' milk 50 to 80 per cent. The alkali combines with the casein and forms a definite compound called basic calcium casein. This product, which is natural to phenolphthalein, will not be changed into a curd by the rennet secretion of the stomach even in the presence of soluble lime salts, as will the natural casein of fresh milk. Many authorities state that 5 per cent. of lime-water is sufficient to add to cows' milk to give it the same reaction as breast milk, but further recommend that the same percentage should be added to the infant's food no matter how much the milk it contains is diluted. Also that for young infants whose food contains very small quantities of milk 10 per cent. of lime-water should be added to the food. In reality, this makes the amount of lime-water added to the actual milk of the food as high as 200 per cent., which would more than convert the casein into basic calcium casein and thus prevent formation of rennet curds. Southworth has recently published a table showing how completely the theory of adding lime-water is abandoned in practice. Any alkali which will render milk neutral or faintly alkaline to phenolphthalein will prevent the action of rennet-forming curds, and explains the effect of the addition of small quantities of carbonate of potassium or borax to milk, and part of the

effect of adding bicarbonate of soda. The effect of alkaline additions to milk, therefore, is that of retarding the effect of the infant's gastric secretions.

Group 3. Methods that prevent or alter the formation of curd in the stomach by inhibiting rennet action, and also by neutralizing the acid of the stomach: (a) addition of 1 or 2 grains of bicarbonate of soda to the ounce of food; (b) addition of syrup of lime; (c) addition of magnesium hydrate.

In the previous method only enough alkali is added to convert the casein of the cows' milk into basic compounds which will not form curds with the rennet ferment in the stomach. When a sufficient quantity of acid is secreted to combine with the alkali the milk is restored to its natural state, and it will then form a curd. In the present group, however, not only enough alkali or antacid is added to form basic compounds with the casein, and so prevent the action of the rennet in forming curds, but enough is added to neutralize any acid which may be secreted which would restore to the milk its curdling properties. All gastric digestion is thus prevented.

The addition of 1 to 2 grains of bicarbonate of soda to each ounce of food is sufficient to neutralize the acidity of the cows' milk. In mixtures in which milk is moderately diluted 5 to 10 grains of bicarbonate of soda are added to each ounce of milk in the food, while in highly diluted milk 20 to 40 grains to the ounce are given. A twenty-ounce mixture, 1:5 milk, would contain 20 to 40 grains of bicarbonate of soda and four ounces of milk. Four ounces of sour milk are neutralized by 15 grains of bicarbonate of soda, so in this case there is added, ostensibly to cover the acidity of fresh milk, a great deal more than would be needed to neutralize the milk if sour. As the milk is not sour, the bicarbonate of soda is not used as an antacid in the milk, but remains unchanged and passes into the infant's stomach ready to neutralize its acid and thus prevent gastric digestion. The milk remains fluid and can easily pass into the intestines. Syrup of lime and magnesia hydrate are alkaline, and also neutralize considerable acid. Experiments on animals have shown that continuous addition of antacid to their food prevents their assimilating food properly and retards development.

Group 4. Methods in which acids precipitate the casein and prevent the formation of rennet curds: (a) buttermilk feedings; (b) koumiss feeding; (c) matzoon feeding; (d) addition of dilute hydrochloric acid.

When acids are added to cows' milk they first combine with the lime of the calcium casein and liberate free casein. If sufficient acid is present it combines with the free casein and forms an insoluble precipitate like the curd of sour milk. The rennet ferment will not form a curd with the precipitated casein of milk, and as this is finely divided and exposes a

very large surface to the digestive juices, it is digested by adults with greater ease than the solid curds formed from fresh milk by rennet. In making buttermilk, koumiss, or matzoon, lactic-acid bacteria develop in the fresh milk, and as they grow produce acid which combines with the casein and forms lactate of casein, which is seen as fine flecks in the milk.

Group 5. Methods that profoundly alter the character of the milk: (a) peptonizing milk; (b) addition of citrate of ammonium, 1 to 2 grains to the ounce of milk; (c) addition of citrate of potassium, 1 to 2 grains to the ounce of milk; (d) addition of citrate of sodium, 1 to 2 grains to the ounce of milk; (e) addition of oxalate of ammonium, $\frac{1}{2}$ to 1 grain to the ounce of milk; (f) addition of oxalate of potassium, $\frac{1}{2}$ to 1 grain to the ounce of milk; (g) addition of oxalate of sodium, $\frac{1}{2}$ to 1 grain to the ounce of milk.

As the curdling of milk in the stomach by rennet will not take place in the absence of a soluble salt of calcium or lime, any addition that will render the calcium of the milk insoluble will prevent the formation of curds. The addition of citrate and oxalate of ammonium, potassium, or sodium causes a combination of lime with the citric or oxalic acid; and of the casein with the ammonium, potassium, or sodium. No rennet curd will form in milk so treated. The milk remains fluid. Adding lime-water to milk so changes the casein that a soluble salt of lime has no effect. Lime-water does not have the effect of a soluble lime salt. Adding to milk peptonizing powder which contains bicarbonate of soda changes the casein into soluble forms, and also neutralizes the acid of the stomach.

Group 6. Methods that indirectly alter the milk: (a) scalding or boiling; (b) pasteurization; (c) sterilization; (d) condensed milk; (e) evaporated creams.

When milk is heated to the boiling point for any length of time it is so altered that the rennet ferment will not form a curd even after acid is added. This can be readily demonstrated by using the unsweetened condensed milks, or the so-called evaporated creams, after diluting them to approximate whole milk in composition, and adding first rennet, and then acid. A control with fresh milk should be used for comparison. Pasteurized milk is also acted upon more slowly than fresh milk, but the addition of enough acid to produce a soluble salt of lime causes typical rennet curds to form. Pasteurizing indirectly retards the curdling by rennet by destroying lactic bacteria which would produce acid, and thus accelerate the action of the rennet by combining with some of the lime of the milk, and thus precipitating the curd.

Group 7. Methods that mechanically alter the curds of milk without affecting the action of the digestive secretions: (a) dilution with plain gruels; (b) dilution with digested or dextrinized gruels.

When milk is diluted with a thin gruel made of a cereal the gelatinized starch of the gruel makes the curd softer and more easily digested. Its action is almost entirely mechanical. If the milk is diluted with a digested or dextrinized gruel the mechanical effect is produced by the flocculent proteid of the gruel which also adds to the nutritive value of the food. It has recently been shown that the proteid of these gruels is often better digested than the proteid of milk.

A study of the above classification makes it evident that all methods of modifying cows' milk are based upon a rearrangement of the tissue building and energy food elements it contains, and interfering by chemical and mechanical means with the normal curdling of the milk in the infant's stomach. The practitioner must bear in mind the principles and apply them as indicated, to the individual case in hand, and remember that a method that may appear to give brilliant results with a sick infant may result in disaster, if indefinitely continued. The normal healthy infant must be fed quite differently from a child with a disordered or diseased digestive tract. Too much of the present-day feeding follows the plan of giving an analgesic and finding the symptoms alleviated, allowing the patient to keep on with the remedy. The infant's digestive disturbances having been overcome, the feeding should be so ordered that grave constitutional diseases due to perverted functions shall not develop.

Some of the best work of the past year has been given to the use of *alkalies in infant feeding*. The action of alkalies has already been referred to, and it is clear that they are very different from what they were formerly supposed to be. They have long been employed under the impression that they acted as antacids, neutralizing the acidity of the cows' milk in order to make it conform to the supposed alkalinity of breast milk. Since breast milk has been proved to be faintly acid by the use of the delicate indicator phenolphthalein in the place of the misleading litmus test, this necessity has lost its force; but, inasmuch as excellent practical results have been obtained clinically by the addition of such alkaline antacids as lime-water and bicarbonate of soda, it is rational to endeavor to find the explanation of their successful use.

Some admirable work in this direction has been done by Southworth.¹ This work, as well as the subject of alkalies in infant feeding, has been referred to on a previous page. Southworth concludes that milk diluted with plain water containing no alkali is promptly clotted in the stomach by the rennet ferment, and the clot is transformed into tougher masses when the acid is secreted. Lime-water added to milk checks the immediate action of rennet upon the whole mass and makes the clotting more

¹ Archives of Pediatrics, February, 1905.

gradual, altering the form of the curd and allowing possibly of the passage of some unaltered milk into the intestine but leaves no large amount of acid behind to inhibit the stomach digestion. With bicarbonate of soda added to milk the action of rennet, hydrochloric acid, and pepsin are all prevented by the greater amount of antiaacid present until this is all neutralized. In the meantime portions of the milk are not liable to get beyond the fluid state and continue to escape into the intestine. This reduces materially the burden of digestion laid upon the stomach, or, if the alkalinity persists a sufficient time, relieves it entirely, the labor falling upon the intestine. In the young infant the stomach is just beginning its functions, and the earliest secretion which acts on the milk is rennet. In view of these facts, it is not difficult to understand the clinical effects of adding 10 per cent. lime-water or 2 grains of bicarbonate of soda to the ounce to the food of very young infants. The food is weak and the proportion of milk small. This amount of alkali in the whole mixture makes this milk decidedly alkaline; the rennet ferment, therefore, will not act and the effect is to promote rapid emptying of the stomach, for, whereas curded milk tends to remain in the stomach, fluid milk tends to pass into the intestine. The effect of adding alkali to the food seems then to be that of influencing the place and type of the digestion of the food, and the problem which must be worked out in the near future will be to determine the kinds of alkali and the proper qualities of alkali to be added if we desire to produce certain specific results, and also to determine more accurately the indications for their use or non-use in different types of cases.

A warning against the *excessive use of fat* is contained in an excellent article by Holt.¹ Not many years ago physicians seemed to think that babies could not get too much fat, but Holt has reached the conclusion that disturbances of digestion resulting from an excess of fat are quite as serious, if not quite so obvious, as those which follow the use of too high proteid, and that they need to be studied just as carefully. Even those who give especial attention to infant feeding have been slow to learn the infant's capacity with respect to the digestion of fat, both in health and in the ever-varying conditions of disease. Others who have given the question less attention have fallen into error in one or two ways. In following the formulas in books, instead of using an ordinary milk, with a fat content of 4 per cent., they have substituted a rich Jersey milk with a fat content of from 5 to 5.5 per cent. Thus, unwittingly, they have given from 5 to 7 per cent. fat, when they had supposed they had given a food containing 3.5 or 4 per cent.; or they have made another mistake of inattentionally increasing the fat, almost without limit, for the purpose

¹ Archives of Pediatrics, January, 1905

of overcoming that most troublesome symptom of artificial feeding—chronic constipation.

As to how much fat may be wisely given to infants in health opinions may, perhaps, differ somewhat. No arbitrary standard can be fixed. Children differ very much in their capacity to digest fats as in other respects, but there is a limit with each child beyond which we may not safely go. If the percentage is raised very much above this for any length of time disturbances are almost certain to follow. Holt has never seen any advantage, but often much harm, from raising the fat above 4 per cent., and has fixed upon this as about the limit for the average child. The physician who assumes to direct the feeding of infants must have some notion of what is proper, must know what he is giving, and must appreciate the difference between giving a food which contains 3 or 4 per cent. fat and one containing 6 or 7 per cent. Although the bad results of the higher percentages may not be at once apparent, they are almost certain to come later. Furthermore, simply to raise the percentage of fat seldom relieves chronic constipation. Whenever there are marked symptoms of either gastric or intestinal indigestion the fat should be reduced much below the normal—3 or 4 per cent.

RHINOLOGY AND LARYNGOLOGY.

By D. BRADEN KYLE, M.D.

RHINOLOGY.

Submucous Resection of the Cartilaginous Septum. The correction of nasal deformities, an old and frequently discussed subject, grows none the less interesting because of its triteness, but rather attracts more and more attention as the profession in general grows more cognizant of the possible antral, sinus, or Eustachian infection which may result therefrom, to say nothing of the constant discomfort to which one is subjected who must live with a unilateral or bilateral nasal obstruction. It is gratifying to see the profession advise the correction of such obstructions, since it is an operation which can be done not only without imperiling the patient's life, but also with but little discomfort. Since Baker's description of his original operation, many so-called new methods have been published, and the originators, equally sincere, have pointed out why their particular method is the best, ignoring the fact that each must be based on the same mechanical law. The fact that we have so many operations for the correction of septal deformities, differing as the case may be in some point of more or less importance, is an indication of another fact, viz., that there are also manifold variations in the character of septal irregularities, so that no one method can be closely adhered to in the correction of all deflections.

So far as the major principles are concerned in every deflection, whether it involves the cartilaginous or bony septum, or both, there are two constant facts or features: (1) There are two fixed points, no matter what the direction, or the angle of deflection, and (2) there is redundant tissue either perpendicularly or horizontally between these fixed points.

The object, then, to be obtained in every case is to place or restore the septum to the median line, having on each side as nearly a plain surface as possible, thus equalizing the size of the two nostrils and establishing free nasal breathing—and at the same time leaving the straightened septum covered with functionating mucous membrane. This will evidently necessitate the removal of, or the displacement and overlapping of, certain tissues, a procedure which everyone experienced

with nasal surgery knows cannot be accomplished in every case by any one method. That the various varieties of deflection will necessitate modifications of every known operation is also apparent, and each individual case must therefore determine which method will be the most available. Too frequently operators, particularly those inexperienced, are prone to follow methods and to be led away by some particular fad, without stopping to reason out the subject for themselves. It is the same error into which men have fallen in every walk of life since the beginning of time—trying to prove the efficacy of some principle or argument instead of testing it. When the orthopedic surgeon attempts to correct a bow-leg he makes a mathematical calculation of the amount of bone tissue it is necessary to remove from the convex side so as to place the bone, when he makes the green-stick fracture, in the median or perpendicular line. Why, then, should not the nasal surgeon, in correcting a deflection of the cartilaginous or bony septum, apply the same principle? Why, because a cartilaginous or bony septum is deflected, dissect out and remove the *entire* supporting structure? Frequently the only explanation offered is that the deflection will never recur. This is quite true, but the orthopedic surgeon certainly would not remove the entire bone lest there should be a further tendency to bow-leg. In the past year a great deal of journalistic literature has sprung from the pen of enthusiasts on the subject of “submucous resection,” a method of merit, in its place, no doubt, yet one which after many septa have been sacrificed will settle itself again to a state of reasonableness, and like other methods be employed where it conforms to rational indications. Rare indeed, however, will the even moderately conservative surgeon, governed not by fad but by the principle of fitness, find in his cases of septal deflection occasion to remove the entire cartilage and bone. In some it is necessary to remove only a small portion of redundant tissue so that the septum may be swung into the median line; while in others of more marked deflection the overgrowth of tissue will necessitate more extensive removal. The submucous resection, then, of a portion of the septum, bony or cartilaginous, is only justified when it is necessary to correct the deformity and allow the septum to swing into the median line. From the amount of literature on the subject one would suspect that this was a new subject when in reality it is not a new method in any sense. To be sure there are some modifications and a multiplicity of instruments, but the principle suggested and involved in the suggestion of E. Fletcher Ingals, of Chicago, almost twenty years ago, and by Hartmann, Roux, Juracz and Krieg, about the same time, is the underlying one of the submucous resection. In later years the method has been modified and employed by Killian, with practically the same technique as that generally adopted today. The abstracts herein given

are from articles published by Killian, Freer and Ballenger, who, having employed this method in a considerable number of cases during the past two years, speak enthusiastically in commendation of its merits.

Killian,¹ in recapitulation, states that: "The essential feature in the technique of my window resection of the nasal septum is that I make, by means of my long specula, a median space between the two mucous-membrane layers of the septum, in which I can as easily operate as in the inside of either nasal cavity. The entrance to this space is the incision, which becomes rectangular in shape through the use of the speculum.

"All the other parts of the operation group themselves about this fundamental idea. The experienced operator can very rapidly elevate the mucous membrane from the cartilage and bone, also at the time of actual resection can remove large pieces. The length of the incision determines this, however. I can perform the whole operation on an average of twenty minutes.

"On account of the great increase in indications for the septum operation, which we have learned in my clinic during the past few years, this operation has with us become a frequent and established undertaking.

"Our rhinological knowledge has gained a great deal through this operation, especially in ability to perform and in exactness. Half of our unnecessary rules have disappeared and we attain in the most elegant way and in the shortest time what was earlier, after a long endeavor, often only unsatisfactorily accomplished. I have never had more enjoyment from any other small rhinological operation than from the described septum operation, and can most enthusiastically recommend it."

In the submucous resection W. L. Ballenger² operates as follows: A curved incision in the septal mucosa is made about one inch in length, beginning near the floor of the nose and curving forward and upward, as high as possible, through the vestibule of the nose and about one-fourth inch posterior to the anterior margin of the cartilage. He has not found it necessary or advantageous to make the incision on the convex side of the septum, as is commonly recommended; but finds it advisable to make it on the left side of the septum regardless of whether this is the convex or concave side. He does this because it is convenient to use the knife with the right hand while the forefinger of the left is inserted into the right nostril. Having made a curvilinear incision through the mucoperichondrium on the left side of the septum, he next resorts to the semisharp elevator of Hajek to elevate the anterior portion

¹ *Annals of Otology, Rhinology, and Laryngology*, June, 1905.

² *Laryngoscope*, June, 1905.

of the mucoperichondrium from the septum, after which Hajek's blunt elevator should be used. The semisharp elevator should only be used to start the elevation, as to continue its use might result in a perforation of the mucous membrane; whereas, the dull elevator can be used with greater rapidity without danger of perforation.

The next step in the operation consists in carrying the anterior curvilinear incision of the mucosa through the septal cartilage to the perichondrium of the opposite side. This is done with a small bistoury, the forefinger of the left hand being inserted into the right nostril to detect when the cartilage is completely incised. After one has considerable experience in the incision of the cartilage with a knife it may not be found necessary to introduce the finger into the opposite nostril, as it can be readily appreciated when he is through by the sense of touch or by the resistance felt with the hand holding the knife. The semisharp elevator of Hajek may be used to perforate the cartilaginous septum along the line of the curvilinear incision by rubbing it to and fro in the mucoperichondrial incision, the index finger of the left hand being inserted into the right nostril to exert counterpressure and to detect by the tactile sense when completely broken through. The incision through the cartilage having been made by either of the above methods, the semisharp elevator should be inserted through it with the flat side turned so as to lie against the right side of the cartilaginous septum, and while in this position it should be moved up and down and insinuated between the cartilage and the mucoperichondrium of the right side. To facilitate this procedure the tip of the nose should be turned toward the patient's right side, thus exposing the curvilinear incision through the mucosa and cartilage, and making it possible to introduce the semisharp elevator on a plane parallel with the septum. After this is started the dull elevator is used to complete the separation. Care should be taken to lift the mucoperichondrium from the entire deflected area, as to fail to do so makes it impossible to remove a sufficient amount of cartilage. The mucoperichondrium on both sides of the septum now being elevated, the prongs of the swivel knife are introduced through the curvilinear incision, one prong being on the right side of the septum, the other on the left. This instrument consists of a handle and two extremities similar to the prongs of a tuning-fork, at the end of which is a swivel-blade knife that swings in a circle. By the resistance of the cartilaginous tissue through which it passes it may be made to cut in any direction in which the distal ends of the prongs are directed.

The instrument should now be directed backward parallel with the floor of the nose until the posterior limit of the cartilage is reached, when it should be directed upward and forward, following the outline of the anterior end of the perpendicular plate of the ethmoid to the

bridge of the nose, when it should be pulled down parallel with the ridge of the nose to the upper extremity of the curvilinear incision. In this way almost the entire cartilaginous septum, except the anterior tip which is left to support the tip of the nose, is removed. The excised cartilage is then seized with a pair of dressing forceps and removed through the curvilinear incision. The time consumed in performing this operation varied from four to fifteen minutes from the first cartilaginous incision to the introduction of the light tampons at the close of the operation.

Otto T. Freer,¹ of Chicago, in discussing this subject draws the following general conclusions:

1. The appearance of deflections does not divide them naturally into two great groups with distinct aspects, one obviously traumatic and the other due to faulty growth, as is taught by Killian. To consider etiology in this way in the description of deflections is merely confusing and it is better, as heretofore, to group them according to their shape.

2. The window resection is adapted to children, but the chance of a possible recurrence from the effects of growth demands a very complete removal of the vestiges of the deflection.

3. The firmness, and therefore probably the cartilage and bone of the septum, is completely or nearly completely reproduced in the window after the resection.

4. Cases seen two and one-half years after the operation show permanency of the result.

5. Though the author has never seen a case of sinking in of the nasal bridge after the window resection, Mueller's and Menzel's warning should be heeded to retain a strip of the cartilage of the septum under the lateral cartilages of the external nose.

6. The lower portion of the quadrangular cartilage, as high as the level of the *ala nasi*, may be resected without fear from its anterior inferior free border horizontally back to the bone.

7. The recumbent position of the patient is the best for the operation, except in operating along the nasal floor.

8. The Kirstein light is the most suitable one.

9. The use of powdered cocaine, applied with a swab, gives a perfect and safe local anesthesia, and the submucous injection of cocaine is needless, except at the very front of the septum.

10. The best access to a deflection for its resection is obtained by mucous membrane incisions along its vertical and horizontal crests, and not by means of a buttonhole cut in front of it, such as is made by Killian and others.

¹ *Annals of Otology, Rhinology, and Laryngology*, June, 1905.

11. The separators used for the elevation of the mucosa should be thin, curved, and either dull or knife-edged for dissection.

12. The presence of a nasal angle in an instrument complicates its movements, and makes it necessary to hold it with a stiff wrist and fingers, thus sacrificing the lightness and accuracy of motion of straight instruments.

13. It is best to make the first cut through the cartilage with a keen, thin, round-bladed knife than with a thicker sharp edge that scratches through.

14. Even if strictly subperichondrial, in the elevation of the mucosa one is apt to encounter adherent places that need separation by keen dissection.

15. The cutting out of the denuded cartilage in one piece is the easiest part of my operation.

16. With the exception of fragments cut with the chisel from the crista incisiva or anterior end of the vomer, the cartilage or the bone should never be broken, twisted or torn from its attachment, but should always be cleanly cut away.

17. My modification of Grunwald's punch forceps has proven the best instrument I have used for resecting the bone, as it is slender and long, and yet easily cuts through the thickest bone encountered.

18. There is a tendency to hasty and incomplete removal of the bony part of the deflection.

19. Sewing is needless.

20. Strips of lint, impregnated with subnitrate of bismuth, make the best tampons. I introduce the strips in layers, so that the flaps are perfectly held in place.

21. Considering the many difficult bony resections met with, I do not think that the operation can be well done in the average time of twenty minutes, the estimated time of Killian.

The Correction of Nasal Deformities by Subcutaneous Operation. John O. Roe¹ discusses the operative technique employed in correcting 7 cases of extreme and unusual deformity of the nose due to disease or accidents of various kinds. The underlying principle of Roe's method consists in doing as much of the work as possible subcutaneously, so as to avoid scarring of the skin, and he has been able to develop this plan to a remarkable degree. Roe points out the importance to the individual of having such deformities corrected, and his results show that by the exercise of sufficient ingenuity and the most careful attention to details it is possible to relieve patients of a life-long disfigurement, which forms a source of embarrassment to them, often amounting to positive torture.

¹ Medical Record, July 1, 1905.

Hay Fever: A Further Clinical Study of the Employment of Pollantin. If the Dunbar serum theory is correct, any introduction of the serum would only render the patient immune to the one irritant, and as every student of this disease agrees that in different individuals we may have different exciting causes, it reverts the whole theory back to one of secretion. There is no doubt that in some cases beneficial results have been obtained by the use of Dunbar's serum or pollantin, but those who have pinned their faith to this remedy as a sure cure for all cases have been doomed to bitter disappointment. Alexander W. MacCoy,¹ discussing this subject, says that from the experience of two seasons' trials with two different serums one can but infer that matters are still sub-judice. The success of 1903 was greatly depreciated by the percentage of failures for 1904. The two season's experiences warrant the belief that the toxins reacting in the large class of Gramineae are not identical with toxins found in certain American weeds. Furthermore, two serums, or a composite serum, will be required to cure or correct the disease as met with in American subjects of hay fever. The serum sent out in 1904 was the product of grasses only, and perfectly adapted to the cure of early attacks, while inactive for many of the later attacks. Therefore, the necessity is seen for the production of a serum adapted to the needs of American patients for both early and late attacks. Again, not only was the 1904 serum composed solely of the antitoxin of grasses, but it was twice the strength of the 1903 serum, and of this fact he was ignorant. This led to the error of pushing the 1904 product in cases showing little or no response, and thereby causing local irritation in the nasal chambers from its too frequent use. With serums of fixed units of strength adapted to the varying conditions of the inhabitants of the American continent, the immunization and cure of all sufferers of hay fever should be a fact accomplished. Hay fever being an acute toxemia can be rendered harmless by the proper antitoxins.

From an article by MacCoy² the following general deductions may be drawn and the failure of the serum treatment be accounted for. Unquestionably the chronic reaction of the secretions of the body is an important factor in the susceptibility of individuals to disease, on which basis I think can largely be explained the fact that at one time an individual resists disease and at another time succumbs. To be sure it is a question of resistance on the part of the individual, but that resistance is largely controlled by the chemistry of the cell or secretion. It also illustrates the fact of the accumulative phenomena of certain diseases, as, for example, in uric-acid diathesis, which Haig has described as the uric-acid storm. There is no reason why these same phenomena could not occur as the result of

¹ American Medicine, July 1, 1905.

² Journal of the American Medical Association, October 1, 1904.

the accumulation of other materials brought about by chemical changes which lessen oxidation and tend to precipitation and accumulation of various morbid products.

The administration of drugs for the relief of, for example, an infective process, probably affects such a process beneficially, owing to the fact that in its action it changes the chemistry of the secretions and blood constituents, thereby producing a chemical compound which either prevents the formation of infectious material or alters the nidus of infection to such an extent that it is not suitable for the growth of bacteria.

The fact that the reaction of the secretion may be apparently acid when there really is present an alkaline condition, explains to us many of the cases in which, from an acid basis, treatment has failed. That such a condition may exist has been shown by Douin and Gautrelet in their studies of the blood; that the reaction of the plasma is really acid, and if waste reaction of the plasma is really acid, and if the waste products are not eliminated this acidity is increased. The secretions and excretions then also become of an acid reaction.

The irritating gases which form in the stomach and intestines and produce laryngeal and pharyngeal irritation are the result of chemical changes in the intestinal secretion, and such chemical change in the secretion can be demonstrated by a study of the saliva. That auto-infections and chemical changes in intestinal secretions have a marked general effect on the individual is well known. Such material absorbed into the system will unquestionably alter the chemistry of all secreting glands, and the compounds formed by such alteration which affect the individual can only be determined by the study of organic chemistry. The asthmatic conditions which are not associated with any organic lesion, I believe, can all be explained on this basis, and when treated accordingly can, in many instances, be relieved.

The effect of climate and altitude on hay fever individuals is interesting from a number of standpoints. If the disease is distinctly a neurosis, why should the patient, as a rule, improve in a high, dry altitude when such altitudes are decidedly irritating to a nervous individual? Why is it that an individual, after having hay fever for several years, will miss one season, or even two, having no treatment whatever? Personally, I think the answer lies in the individual, at least in a majority of cases, and that the secretions of such individuals having changed under certain conditions were non-irritating. The famous case of Mackenzie's, in which the artificial rose produced an attack of hay fever, surely is strong evidence in the line of neurotic origin. At the same time, in a nervous individual with a perverted nutrition, and necessarily perverted secretion, any particle of dust of anything whatever that would stimulate the nasal

mucous membrane would promote the flow of secretion, which secretion, being decidedly irritating, would at once bring on an attack.

Is it not possible that certain pollens coming in contact with the nasal mucosa, thereby acting as stimulants, promote the flow of secretion, and when such secretion is poured out on the surface either, as I stated before, as an irritating secretion or when combined with the pollen, a chemical change takes place and an irritating material is produced? Dunbar's inoculation theory surely proves this statement, and agrees exactly with what I have said as to the secretions. Under this class of cases would come the rose cold, the rag-weed fever, the horse fever, hay fever, rye fever, etc. Think of the difficulty of procuring an antitoxin for horse fever! In all such cases I think that the secretion in the predisposing and the extraneous material or pollen is an associated factor.

As is shown by Dunbar the inoculation method is not successful in all cases. This is easily understood, as the chemistry of the secretions in the various individuals are markedly different; so that instead of an antitoxin for an exciting factor, use preventive measures by altering the secretion. My own experience surely justifies this statement.

Peculiar Form of Chronic Hyperplasia of the Mucous Membrane of the Upper Respiratory Tract. Considerable confusion exists in the classification of hypertrophies and hyperplasias as applied to mucous-membrane lesions. A true hypertrophy of the mucous membrane is an exceedingly rare condition; it implies an increase in the connective tissue and epithelial structure of the part, with an increase in function. Hyperplasia is an overgrowth of the connective tissue alone, with no increase in the epithelial element and no increase in function. Organized inflammatory cells in the connective tissue of the submucosa, if no contraction has taken place, resembles microscopically hyperplastic tissue and is frequently mistaken for it.

Felix Semon¹ reports 7 cases of a hitherto apparently undescribed form of chronic hyperplasia of the mucous membranes of the nasopharynx, pharynx, and larynx. Although there was some similarity in the clinical appearances of all these cases, the cause of the peculiar swelling was in 3 cases determined to be tuberculosis, syphilis, or acute septic infection. The remaining 4 cases were not associated, so far as could be judged, with the presence of any specific micro-organism. The mucous membrane was uniformly thickened and presented a peculiar yellowish, shiny, somewhat gelatinous-looking appearance, resembling that of a lardaceous kidney. The condition showed no tendency toward a destructive metamorphosis and treatment was of no avail. Microscopically, the condition presented itself as a chronic hyperplasia of the interstitial tissue of the

¹ Lancet, London, February 25, 1905.

parts involved, of apparently progressive character, with no tendency toward degeneration, and unassociated with the presence of any specific micro-organism. The investing epithelium was everywhere intact and normal. The lesion presented none of the structural features of tuberculosis, syphilis, or rhinoscleroma. The overgrowth of connective tissue had no relationship with a neurofibromatous pachydermia, since the nerves were not involved in the general fibromatosis. The enlargement was not due to a dilatation of the lymph spaces, nor did it bear relegating to the group of angioneurotic cedemas. The complete absence of chronic arterial change removed any relationship between the disease and erythromelalgia. The histological changes approached most nearly to those met with in hyperplastic rhinitis in what has been called its secondary stage.

Mucin in Atrophic Conditions of the Nose and Throat. Atrophic conditions of the nasal mucous membrane have, in the majority of cases, associated ozena. Owing to the pathological change, which occurs in the mucous membrane in atrophic conditions, the process is a retrograde and permanent one; for this reason the beneficial therapeutic agents, which can be applied locally with more than transient effect, are limited.

J. E. Newcomb¹ calls attention to some of the properties and uses of mucin as a therapeutic agent. He states that mucin artificially applied to the nose and pharynx has a soothing and emollient action, moistens the surface, and softens incrustations, readily facilitating their removal and preventing their reformation. The mucin solutions assist in eradicating fetor, and by their hygroscopic action, which is about one-fourth as great as that of glycerin, they tend to restore the function of smell and favor the filtering and warming functions. Combined with an alkali, the solutions neutralize the acid often found in atrophic rhinitis.

Ozena Treated by Diphtheria Antitoxin. Since ozena is only a symptom and is brought about by altered secretions and retrograde tissue change, it is difficult to understand how the injection of diphtheria antitoxin would influence the pathological condition which produced the symptom; however, it is interesting to note that Tarnowski² says that he has succeeded in arresting a beginning case of this affection by a single injection of 1500 units of antitoxin. In a second case, which had been treated by sodium soziodolate for a considerable period without effect, 1500 units in eight days produced a permanent result. In a third case, of forty years' standing, no definite success was obtained, but the production of crusts was lessened to a great extent.

TREATMENT OF OZENA BY PARAFFIN INJECTION. Since the introduction of paraffin for the correction of nasal deformities considerable

¹ Annals of Otolaryngology, Rhinology, and Laryngology, December, 1904.

² Deutsche med. Wochenschrift, 1904, No. 23.

experimentation has taken place as to its beneficial effect in other conditions. At the time of its introduction there was considerable discussion by the physiologist and pathologist as to the probable after-effect of the paraffin on the tissue, the general consensus of opinion being that sooner or later it would act as an irritant, in reality a foreign body. Observation has shown that after the paraffin remains in the tissues for from one to three years it does act as a foreign body, thus verifying the opinion expressed at the outset. When there is evidence of bad results from the use of paraffin the great difficulty is that we have no means for its removal, and the last state of the patient is liable to be much worse than the first. Theoretically the idea of using paraffin in atrophic cases with ozena is a good one, but equally as good, if not better, results can be obtained by the use of German wool in the nostril. It produces almost the same effect, and there is not introduced into the tissue a substance which cannot be removed at will.

P. J. Zaalbers¹ has treated sixty patients during the last year by means of paraffin injections; although the results are very recent, he believes that he will not be disappointed in the future. Twenty were cured, thirty-five were much better, five remained the same or have disappeared. A case is considered cured when the fetor has disappeared and crust formation stopped. Amelioration means an occasional slight return of the fetor, with little secretion, which can be controlled by nasal cleaning, every one, two, or three days; the crust formation is in such cases very slight. In the cases in which he had failure there was almost complete disappearance of the concha, which prevented injection; the treatment of the septum gives no results. The results speak against Grunwald's theory that ozena is nearly always caused by the suppuration of the cavity. Zaalbers had a couple of cases with suppuration of the ethmoid, where the paraffin injections afforded relief of the ozena while the suppuration remained unchanged. His syringe is a simple one of metal, with a cannula long and thick, having a curvature at the end, which makes the injection easier. He injects in the posterior part of the inferior concha after cocaineization; the middle concha is also treated. The number of injections changes; sometimes in one sitting both conchæ can be injected, sometimes they must be repeated eight to ten times. The injections are usually painless; the nasal surroundings are often swollen during the next few days, which is painful, and there is lachrymation if it is injected too far forward; these symptoms pass without consequence.

Therapeutic Value of Medicated Ointments in Certain Affections of the Nasal Chambers. Certainly, in 50 per cent. of the cases in which there

¹ Netherlands Laryngology, Rhinology, and Otological Society; abstract, *Annals of Otology, Rhinology, and Laryngology*, March, 1905.

is a catarrhal condition of the mucous membrane of the upper respiratory tract the cause is not a local one, the catarrhal condition being a local manifestation of a systemic condition, and instead of using nasal washes and ointments the underlying systemic etiologic factor should be searched out and remedied. The nasal mucous membrane is in many cases irritated and a supposed local disease aggravated by the washes or sprays. The use of medicated ointments as suggested by Alexander W. MacCoy¹ is certainly less irritating and productive of as good results as those obtained by douche or spray.

Headache Due to Nasal Disease. This interesting subject has received considerable attention in recent years, and nearly every practitioner frequently observes such cases. Not only headache but facial neuralgia frequently has its origin in the nasal or accessory cavities.

A. L. Whitehead,² of Leeds, states that it is now recognized that headaches may in some instances be caused by nasal diseases, but the relative frequency of these cases and the condition of the nose giving rise to pain are not well understood. Diseases of the nose giving rise to headache may be conveniently placed in three groups: (1) acute and chronic catarrh, or suppurative processes in the nose or its accessory cavities; (2) deformities, or diseases which cause mechanical interference with the functions of the nose; (3) cases of latent obstruction, which are specially apt to escape detection. His conclusions are: 1. Nasal disease is undoubtedly the cause of headache in a certain percentage of cases, although it is doubtful whether it is possible for headache to be produced by any nasal condition which does not give rise to discharges or to obstruction to normal nasal respiration. 2. In cases of persistent headache careful examination of the nose should be made, since in some instances the nasal symptoms may be ignored by the patient. 3. Suppuration in the accessory sinuses and marked nasal obstruction, constant or intermittent, should be thoroughly treated. 4. Small spurs, deviations, and hypertrophies not causing obstruction should be left alone, as no relief will be given from headaches by their treatment. 5. If the middle turbinate bones are enlarged or pressing upon the septum, especially upon the tubercle, and if all other possible causes of headache have been eliminated, partial removal of the hypertrophied bones should be advised.

Adrenalin Chloride in Asthmatic Attacks. While adrenalin has been used as a therapeutic agent for some years, and in a great variety of conditions, yet its physiological action is not definitely understood, and it should not be used except with extreme care.

D. M. Kaplan³ recommends the use of hypodermic doses varying from

¹ Laryngoscope, February, 1905.

² British Medical Journal, January 23, 1905.

³ Medical News, May 13, 1905.

ten to twenty-five minims. Each patient is treated individually. Large doses are especially indicated in extensive emphysema with weak heart. The lower the tension in the radial artery the lower it will be in the pulmonary capillaries; therefore, the dose must be larger to augment this tension. Neurotic persons, or those with arteriosclerosis, should receive small initial doses. If the drug does not produce its full effect the seizures may soon recur. There should be increased tension, shortened systole, lengthened diastole, and coarse tremors. The cardialgia resulting is of no importance. The contraindications to adrenalin are generally overstated, and it is more efficient in the relief of asthmatic attacks than any of the drugs ordinarily used, although in no sense curative of the disease. Even large doses do not give rise to glycosuria.

Melanotic Sarcoma with Manifestations in the Nose. Metastases in malignant growths frequently present a curious and interesting involvement. This is shown in a case reported by Wendell C. Phillips:¹ F. W., aged forty-seven years, enjoyed good health during childhood. At the age of about eighteen he noticed what seemed to be a mole on the right leg just above the knee. The growth remained practically the same size for a number of years, when it began to gradually increase until twelve years ago. As the growth increased it became softer, so that the diagnosis of naevus was made and its removal effected by means of strangulation, a silk ligature being used. The wound healed nicely after a few days, but in about a year another similar growth started about one inch to the left of the original. The second growth grew rapidly and was partially removed. One and one-half years ago, after a reappearance covering a much larger surface in the vicinity of the original growth, a radical operation was done and the entire growth removed under ether anæsthesia. The wound healed rapidly, but almost immediately he began to notice small black specks appearing upon various parts of his body. One large one appeared on the left side of the nasal septum, which still remains. Another one has made its appearance on the soft palate and involves part of the uvula. There is another one on the right arytenoid cartilage and another in the postnasal space. There is but little induration or infiltration in these masses, and those situated upon the mucous membrane are less inclined to the oval appearance and seem to spread out over the surface. At the present time he has one hundred and ten of these small dark growths. They are very dark blue, in fact almost black in color. He has considerable cough and expectoration and is gradually losing strength and vigor. The diagnosis of melanotic sarcoma was verified by consultation. Examination of the eye-grounds shows a peculiar pigmentation just below the

¹ Laryngoscope, June, 1905.

disk and some old spots of choroiditis. The pigmentation is suggestive of the presence of the sarcomatous deposits in this location. Eleven years ago he developed syphilis, which has been properly and thoroughly treated. The patient has a somewhat waxy appearance, but is still attending to his usual occupation and seems to endure the strain of his work with but little difficulty.

The Accessory Nasal Sinuses. During the past year there has been considerable in the literature concerning the acute and chronic lesions of these cavities. A. Logan Turner,¹ of Edinburgh, in a comprehensive article on "The Operative Treatment of Chronic Suppuration of the Frontal Sinus," brings the subject up to date and meets the conditions from their varied surgical standpoints. He says that there are certain symptoms and local conditions which make surgical interference imperative; these are symptoms suggesting cerebral complications; pain, usually of the nature of headache, which may be of a very severe persistent type; distention of one of the bony walls of the cavity or the presence of a fistula discharging externally. If the general bodily health of the patient is evidently affected by the continued suppuration, or if he should suffer from great mental depression or anxiety regarding his condition, a state of affairs which sometimes exists in these cases, we should not refrain from urging the operation. Frequently, however, we meet with cases in which there are no symptoms present save a persistent nasal discharge of greater or less amount, which may cause comparatively little annoyance to the patient. Under circumstances such as these we should take the patient into our confidence, lay the pros and cons before him, and leave the decision so far as possible in his own hands. In the event of his purposing to reside where surgical skill cannot be readily obtained, or if he meditates applying for life insurance, then our influence ought to be used in favor of operation.

In speaking of the intracranial complications, Turner says that our attitude toward the class of cases in which a purulent discharge is practically the only symptom, would be considerably assisted by a better knowledge of the risk of the possible occurrence of such complications. Opinions differ regarding the relative frequency of the onset of complications of this kind, as comprehensive data on the subject is difficult to obtain. Since the publication of Dreyfuss' monograph in 1896 more attention has been paid to the nasal cavities as a primary seat of infection, but for a long time no systematic postmortem examination of the nose was made in cases of death from septic intracranial mischief.

The postmortem evidence of intracranial infection is somewhat meagre. Newton Pitt gives an analysis of 9000 autopsies and found only 1 case of cerebral abscess due to nasal suppuration; the patient had had nasal

¹ Journal of the American Medical Association, February 4, 1905.

polypi and ethmoid disease. Gowers considers that chronic nasal disease is an occasional, but rare, cause of cerebral abscess. In 1895 Kuhnt, in his work on the frontal sinus, collected 17 of intracranial complication associated with suppuration in that sinus. Dreyfuss, in his monograph published in 1896, reported 19 cases of a like nature following frontal sinus suppuration. Killian, in his article on the frontal sinus, brings the total number of frontal sinus complications up to 30. Since that date Turner has been able to add 12 additional cases not included in the statistics of the above-named writers, making the total 42.

In the treatment of this condition, if operation is not deemed necessary, we must endeavor to maintain free drainage in the nose and not permit the patient to pass altogether from our observation. There is no doubt that in some cases the more aggravated conditions are relieved, and the state of the patient becomes more satisfactory when the intranasal condition is carefully attended to. Nasal polypi are to be thoroughly removed along with the anterior end of the middle turbinated bone, and the anterior ethmoidal cells opened into, thereby establishing better drainage and rendering the outflow of secretion more easy. It is necessary to bear in mind that the intranasal treatment outlined above should be carried out as a preliminary to an external operation on the sinus. Having decided that operative procedure is necessary, he then discusses the Ogston-Luc method of operation. Probably no operation, or a slight modification of it, has been more generally accepted and performed on the frontal sinus, yet more extended experience and a careful consideration of the results obtained from it go to show that the class of cases which is really suitable for this procedure appears to be a comparatively small one. This is due mainly to anatomical causes. If it is borne in mind that the frontal sinus is not always a simple chamber, but, on account of the existence in many instances of incomplete bony septa and partitions in its interior, giving rise to one or more diverticula or recesses, it is difficult, and sometimes even impossible, to deal effectively with the whole cavity in this operation. In consequence of this pus and diseased mucous membrane may be overlooked and foci are left to cause fresh infection of the surface which has been curetted. Another difficulty which may present itself and which must obviously lead to the failure of the operation, is the existence of a communication between the two sinuses through the intervening septum. Still another point which calls for attention is the difficulty of gaining sufficient access to the anterior ethmoidal cells. Suppuration of the ethmoidal cells may be concomitant of chronic suppuration in the frontal sinus. Consequently, in seeking to establish a free communication between the sinus and the nose, an attempt must be made to destroy or remove the diseased ethmoidal air spaces which may otherwise prove a source of reinfection.

In discussing the operation for obliteration of the sinus, the so-called method of Kulint, he says both anatomical and clinical evidence appear to be against the performance of an operation which does not permit of thorough inspection of the sinus and of the possibility of establishing a free communication with the nasal cavity by destroying the anterior ethmoidal cells should they also be diseased. In the majority of cases, therefore, an alternative procedure must be sought for by the carrying out of which the chances of failure and the risks of fatality are diminished. In order to bring this about it is necessary to remove the whole of its anterior wall and also to a greater or less extent its floor. The removal of the floor is a valuable addition to the operation, he thinks, in those cases in which there is considerable extension of the sinus along the orbital roof. The removal of all the bone between the sinus and the soft tissues of the orbit is a guarantee that any ethmoidal cell extension into the roof of the orbit has been destroyed. By this radical procedure the whole of the interior of the cavity, however large it may be, can be thoroughly inspected and no recesses can escape our observation. By this means also easier access is obtained to the ostium frontale and the diseased ethmoidal labyrinth may be more freely dealt with. Finally, there is a satisfaction in knowing that there is no longer a frontal sinus in which to fear recurrence of suppuration. If the curative results from the more radical methods are considered, that is to say, in those cases in which the cavity of the sinus is obliterated, it is found that the figures compare favorably with those obtained after the Luc operation. In 67 cases a cure was effected in all but one, thus showing a very marked difference in the results as compared with the percentage of cures by previous methods.

In speaking of the postoperative mortality, Turner says that a considerable number of deaths have followed operation on the frontal sinus, and on that account we must necessarily regard it as one of the major operations of surgery. It is impossible to state with any degree of certainty how many fatalities have occurred, as there must be many cases which remain unrecorded. He has succeeded in collecting 24 cases in which death followed operation on the frontal sinus. There is, however, another very important aspect of this subject, and that is the question of disfigurement. There is no doubt about the cosmetic advantages of the operation performed according to the method first practised by Ogston-Luc. With the obliteration of the sinus, on the other hand, and the necessary removal of its anterior osseous wall, the contour of the forehead is to a certain extent destroyed. Turner then discusses the osteoplastic method in which a bony flap is raised from the anterior wall of the sinus. It is his opinion that the Killian operation fulfils the two main requirements in these cases more than any other method does—

namely, the radical treatment of the disease with a minimum of disfigurement. Certain general conclusions may be drawn from a study of this subject. When the sinus is a small one and can be thoroughly inspected through the aperture made in the anterior wall, and when no ethmoidal disease coexists simple opening and draining after the method of Ogston-Luc may prove satisfactory. In these cases it is very necessary to insure a permanent communication between the sinus and the nose. On the other hand, it may be preferable to obliterate such a cavity without incurring the risk of much disfigurement. In every other class of cases he recommends and practises obliteration of the sinus.

Purulent Maxillary Sinusitis. Inflammatory conditions of the accessory cavities frequently present an interesting and unique chain of symptoms. The variation in anatomical structure, together with the peculiar forms of infection, renders it very difficult to lay down any characteristic chain of symptoms. Lambey¹ reports a case of maxillary sinusitis in a girl aged seventeen years, in which there was a fistula at the anterior angle of the left orbit consecutive to an odontoma. This condition had existed for seven years. The middle meatus contained mucous polypi bathed in pus. Puncture of the inferior meatus and syringing through a cannula showed free discharge of fetid pus both by the nose and by the fistula. The upper left canine tooth was absent and there was a fistulous tract from which exuded pus on compression of the gums. The sinus was opened, showing a pus membrane and fungosities. The opening was enlarged and an odontoma was forced out, evidently corresponding to the absent canine tooth. The sinus was carefully curetted and the patient made a good recovery in less than six weeks.

Non-erupted teeth are frequently the cause of facial neuralgia and peculiar accessory cavity lesions. Careful attention should always be given to the number and conformation of the teeth and any condition involving the nasal or accessory cavities associated with peculiar symptoms.

Skiagraphy as an Aid in the Diagnosis and Treatment of Diseases of the Accessory Sinuses of the Nose. Any suggestion or addition to our present knowledge of diagnosis and treatment of conditions of these frequently affected sinuses is always interesting if not conclusive. That skiagraphy is an admirable aid from a diagnostic standpoint is shown by C. G. Coakley,² who says that it is possible by means of a skiagraph to determine the presence or absence of a frontal sinus which extends vertically above the glabella. A frontal sinus may be small, parallel with the upper inner margin of the orbit and not detected in the skiagraph. In all cases of unilateral disease of the frontal sinus, verified by operation,

¹ *Annales des maladies de l'oreille, du larynx, etc.*, December, 1904.

² *Annals of Otology, Rhinology, and Laryngology* March, 1905.

he has observed a cloudiness in part or in all the area occupied by the sinus and indistinctness in the outline of the cavity when compared with the opposite or healthy side. These skiagraphs invariably showed the frontal sinus to be somewhat larger in all dimensions than it proved to be when operated on. This was undoubtedly due to the divergence of the rays as they passed from the tube to the plate. A good negative may be depended on to show the septum separating one sinus from another. The various incomplete septa that may be present in each sinus are usually shown quite clearly. An oblong, narrow, much darker area, nearly parallel with the upper margin of the orbit on its nasal side, and usually just above it, whenever present, has been found to be an orbital prolongation of the frontal sinus, running anteroposteriorly above the orbit, oftentimes the full depth of the latter. The examination of a skiagraph of the two frontal sinuses when compared with results found on transillumination will aid very much in determining the presence of a diseased sinus. Skiagraphy may prove a valuable aid in determining our method of treating a chronic suppurative frontal sinusitis. A skiagraph also may be of considerable value in determining the height and width of the ethmoidal cell area and the sphenoidal sinuses. If the plate can be so arranged as to include the superior maxilla as well, a chronic suppurative process in an antrum presents the same filmy appearance as above noted in similar conditions of the frontal sinus and ethmoidal cells. A healthy antrum presents an irregular, triangular area, dark in color, with a few light-colored septa running through it, many of which are ridges present in the wall.

The Relative Frequency of Dental Origin of Antral Empyemata. The special surgeon is thoroughly familiar with the pathology and treatment of antral suppuration associated with dental and nasal lesions. The anatomy of the parts, however, is well brought out by George L. Richards,¹ who, after reviewing the literature somewhat at length, quotes Alexander Strubell, of Dresden, in the *Monatsschrift für Ohrenheilkunde*, of June, 1904, who found that there was the greatest variation in the opinions expressed by so-called authorities on the relationship of the vessels of the antrum to those of the teeth; he found also apparently cases of antral empyemata of dental origin in which there is no communication with the antrum to be seen, and yet in which the clinical history would seem to admit of no doubt that such cases of empyemata had originated from the teeth. He set out to see if he could not anatomically find some relationship between the vessels of the teeth and those of the antrum, or at least some condition that is not as yet fully understood by which the pathogenic focus could be carried to the antrum.

¹ *Annals of Otology, Rhinology, and Laryngology*, March, 1905.

mucous membrane. In most anatomical writings there is nothing concerning this, although Zuckerkandl, in his article in Scheff's *Handbook of Diseases of the Teeth*, states that the vessels that supply the alveolus communicate with those of the external periosteum; that in the upper jaw there is in addition to the external periosteum an inner one, namely, the deep layer of the mucous membrane of the sinus, to which at the same time the arteries of the bone lead, and the veins from which lead to the bone. Strubell, finding nothing further in anatomical and clinical literature, made personal studies on this matter in Professor Zuckerkandl's own laboratories. As a result of the examination of the specimens he found that there were three vessel systems, a long and narrow one extending to the deeper layer of the mucous membrane of the antrum; a coarse mesh vessel system of the spongy bone of the upper jaw, and a fine mesh one corresponding to the alveolus and covering the tooth root. The junction of the vessels of the mucous membrane periosteum with that of the bone is brought about through numerous short, thick vessels, coursing at short intervals in canals at right angles to the direction of the bone, while the obliquely coursing arteries of moderate size, that bring about the communication between the blood system of the spongy bone with that of the alveolus, are reinforced by a large number of the finest bloodvessels. Hence, it seems proper to say that the nourishment of the antrum and its periosteum, the spongy portion of the upper jaw, and the teeth in the alveolus all come from one set of vessels which anastomose with one another in the most extensive way. It is easy, therefore, to see that an inflammation may travel from the teeth to the antrum without there being a direct continuity of the surface or a direct infection from one diseased area to the other. Those who think that the inflammation comes from the teeth base their opinions on the fact that many tooth roots, especially those of the first and second molars, reach almost to the periosteum of the antrum and are separated from it by a thin plate of bone, while in others even this thin plate is not present. Caries of these teeth, therefore, leads easily to the periosteum, and not infrequently to the formation of pus. Inasmuch, however, as almost all people have carious teeth, and as empyema of the antrum is comparatively rare, this argument rather loses its force. Even if after extraction of a tooth an empyema appears that previously had given no particular signs of its presence, it is perfectly possible that the empyema could have lasted several years. The communication between the teeth and the antrum can have grown up and this be reopened by the extraction of the tooth. That the inflammation can pass directly from the nose to the antrum seems to be the belief of a majority of the present-day writers, who rather hold the preponderance of the nasal origin of antrum trouble. The anatomist Zuckerkandl held that the antral

empyemata of dental origin occurred very infrequently. As a proof of his belief that the inflammation could pass directly (especially purulent inflammation) from the nose to the antrum, the following facts are cited: First, the cases of empyema that followed sound teeth; second, purulent inflammations of the sphenoid and frontal sinus; third, the presence of primary and inflammatory processes of the nasal mucous membrane.

The Relation of Ethmoidal Inflammation to Asthma. There is a vast difference between dyspnoea and asthma; and paroxysmal difficult breathing does not necessarily mean asthma. Whether asthma is a disease or a symptom of a disease matters little to the patient, as the asthmatic attack is the predominating symptom for which he seeks relief. A rather unique view of the condition is taken by H. Coggeshall,¹ who states that asthma is a name given to paroxysmal difficult breathing, and that the disease is an inflammation of the mucous membrane of the ethmoid cells. An irritation of the trigeminus or olfactory nerves causes an altered activity in the medulla—that is to say, in the centre of respiration. The result in the bronchial tubes is a vasomotor disturbance or contraction of muscles, or both. Other varied factors are the contributory causes of asthma. Errors of nutrition and diet, gout, obesity, lymphatism, impure air, and poor circulation are such causes. To these he adds direct irritation to the nasal mucous membrane by such irritants as pollens, emanations from animals, dust, smoke, and many other irritants as the exciting factor in the cases suffering from periodic asthma.

LARYNGOLOGY.

Tonsillectomy: Thorough, Painless, and Safe. In the method suggested by E. Fletcher Ingals,² of Chicago, which seems to be an excellent procedure, he recommends that when anæsthesia is nearly complete the patient should be placed in the prone position, the mouth-gag is then inserted between the jaws on the upper side of the face, and opened as widely as necessary. It is usually found necessary to continue the anæsthetic for a few minutes afterward to complete the anæsthesia, because these patients do not breathe well on account of the nasopharynx being filled with adenoid growth, and they do not come fully under the anæsthetic until the gag is put in to hold the mouth open.

In removing the right tonsil, he sits with his left hand toward the patient's head, and introduces a blunt hook between the anterior pillar of the fauces and the tonsil, while the tongue is kept down by the depressor held in the left hand. He then removes the tongue depressor

¹ Medical Record, June 3, 1905.

² Journal of the American Medical Association, February 4, 1905

and opens the blades that terminate in the blunt hook wide enough to separate the anterior pillar thoroughly from the tonsil, by which act the tonsil is freed from a considerable part of its bed, so that it may be easily caught by a forceps. Should the anterior pillar not be attached to the tonsil this will not be necessary, but the gland may be grasped at once with a tonsil forceps. In applying the tonsil forceps it is usually best to have an assistant press the tonsil inward with the fingers applied just back of the angle of the jaw so as to make the gland more prominent. When the tonsil has been seized the handles of the forceps are locked, the tip of the uvula is then secured and held out of the way by an assistant. The loop of wire of a snare is then slipped over the handles of the forceps holding the tonsil and carried along them into the mouth and over the end of the forceps. If the tonsil is of fair size, so that it is held firmly, it may now be drawn on and lifted up so as to make certain that the wire slips under it; otherwise a little care will be necessary to make sure that the wire is beyond the broadest part of the blade, so that when it is tightened it will slide down to the end of the blade and slip under the gland, to cut it off at its lowest point. The wire loop is now drawn tightly about the base of the tonsil by a moving bar on the handle of the snare; the uvula is then freed and the milled wheel on the handle of the snare is brought into use for the final tightening of the loop.

Ingals found in nearly all cases, if care had been taken in grasping the tonsil, every portion of the gland was removed at once, and if it had not been necessary to separate the anterior pillar the bleeding would not have exceeded a drachm. The patient is then turned so that the face projects over the left edge of the table, the blood is wiped out of the mouth, the left tonsil is caught and extirpated in a similar way; then if the pharyngeal tonsil is enlarged, it is also thoroughly removed. In the latter case the after-treatment consists of the application through the nares, four or five times a day, of an antiseptic oily spray, or of a 1:4000 solution of adrenalin chloride or supra-adrenalin in a saturated solution of boric acid; if, however, the child is large enough an antiseptic gargle is used several times daily. When only the faucial tonsils are removed it is desirable to have the throat sprayed or gargled with some non-irritating antiseptic about once an hour for two or three days, and afterward about half as frequently until healing is complete.

Tuberculosis of the Tonsil. Considerable experimentation and discussion has taken place within the past year in regard to the tonsil as a portal of entrance of tuberculous infection. The excellent work by Jonathan Wright, Goodale, Wood and others seems to establish fairly definitely that infection does take place through the tonsillar structure.

Some interesting data is given by O. Reimann.¹ He states concerning the portal of entrance of tuberculous infection that the tubercle bacillus may enter at any point, choosing for this location usually a spot of diminished resistance, and may produce its first manifestation elsewhere. He reviews the literature on the subject of tonsillar tuberculosis, and then reports the result of the examination of 61 patients afflicted with tuberculous tonsils. He found that tuberculosis of the tonsils may be primary or secondary; cases in which only the tonsils are affected are extremely few in number. Cases in which the tonsils very probably acted as portals for entrance for the tubercle bacillus can be discovered only so long as the lungs remain free from foci, from which tubercle bacilli may get into the sputum. If statistics of children's autopsies only are considered this number is about 4 per cent. Inasmuch as in the tuberculosis of rabbits produced by the feeding of tuberculous material the maxillary and cervical glands are affected before the bronchial glands and lungs, and the intestines usually remain free, a wrong conception is produced concerning the frequency of the food tuberculosis in children, if only such cases are considered which present intestinal ulcers and cheesy mesenteric glands. From animal experiments it may be assumed that a large number of complicated tuberculous cases in children, in whom the lung is diseased, originate by this mode of infection even though no pathological proof can be adduced. In advanced pulmonary tuberculosis with sputum containing large numbers of tubercle bacilli the tonsils are usually the seat of tubercles, even though they are not visible externally and the tonsils apparently intact. The examination of his own 80 cases showed that of young girls and women with apical tuberculosis whose sputum contained tubercle bacilli there was tuberculosis of the tonsils. He also found tuberculosis of the tonsils in 6 per cent. of patients without any expectoration whatsoever. In one case after the removal of a tuberculous tonsil the stump remained free from recurrence.

W. S. Anderson² also calls attention to the tonsils as frequent portals of infection. Besides severe infections, he believes that many mild chronic infections are constantly taking place through the diseased crypts of the tonsils that are frequently not recognized. If the tonsils are the source of obstruction or irritation, or if the crypts are diseased and the seat of septic absorption, then it is our duty to advise the removal of the tonsils or the destruction of the crypts.

Pneumococcal Sore Throat. It is a well-established laboratory and clinical fact that upon the reaction of culture media depends largely the growth and virulency of bacteria, and cell resistance to bacterial

¹ Inaugural Dissertation, Greifswald, 1904.

² New York Medical Journal, April 29, 1905.

invasion depends to a great extent on its physiological chemical reaction. Peculiar infections can easily be explained on this basis.

W. Pasteur¹ calls attention to pneumococcal angina, and says that of the acute inflammations of the faucial region this is one which has not as yet received the attention it deserves. The occurrence of inflammatory lesions of various mucous membranes, with or without membranous exudation, in association with pneumonia and bronchopneumonia, has been recognized for many years. Referring to the probable frequency of acute membranous pharyngitis and tonsillitis of pneumococcal origin, Foulerton² remarks that "the exact bacteriological identification in these cases is rendered difficult by the fact that the organism is a frequent parasite of the healthy mouth. But the number of cases in which there are the formation of a false membrane and destruction of the superficial layer of the epithelial membrane associated with the presence of a coccus in predominant numbers, and without any of the other bacteria—*bacillus diphtheriae*, *streptococcus pyogenes* and *saccharomyces albicans*—which are known to cause similar lesions, leaves little doubt as to the fairly frequent occurrence of an acute membranous pharyngitis due to this cause." The local signs of pneumococcal pharyngitis are in no sense distinctive. The membranous form may closely simulate diphtheria, and a bacteriological examination alone will reveal the true nature of the case. Somewhat similar appearances are also met with in some cases of streptococcal inflammation of the throat, but here the exudate is usually thinner and looser in texture and less adherent than in pneumococcal or diphtheritic inflammations. More reliance may be placed, in his opinion, on the early symptoms and mode of onset. In pneumococcal sore throat the onset is usually quite sudden, often with rigor or chills, the initial symptoms are severe, and the temperature rises rapidly to 103° or higher—a grouping of symptoms strikingly like those of pneumonia and very rarely met with in anything like the same degree in diphtheria or even in streptococcal pharyngitis. The disease tends to run a short course—from two to five days—but to this there are exceptions. The erythematous form of the affection is most likely to be mistaken for scarlatinal angina, and here the diagnosis—apart from bacteriological findings—must rest mainly on the absence of other signs of scarlet fever. It is worthy of note that a considerable number of recorded cases of pneumococcal sore throat have been in adults.

Vincent's Angina. In membranous inflammatory processes involving the pharyngeal and tonsillar mucous membrane, in order to make a positive diagnosis, bacteriological investigation is essential. The clinical phenomena varies so considerably, depending on the degree of infection

¹ Lancet, May 27, 1905.

² Transactions of the Pathological Society of London, vol. liii, p. 293.

and the general condition of the patient as to frequently be misleading. The color of the membrane may lead to wrong conclusions, as this color will vary in accordance with the reaction of the secretion. In the peculiar and rare varieties of membranous inflammatory processes involving the upper respiratory mucous membrane considerable importance from a diagnostic standpoint should be attached to the bacteriological examination. In the majority of cases it is only through bacteriological examination that a definite diagnosis can be made. W. M. Berkeley thinks the failure of many laryngologists and pediatricists to recognize Vincent's angina is due to their attention not being especially called to its clinical features. It begins as a grayish necrosis, resembling the diphtheritic membrane. When this sloughs it reveals an ulcer often half to three-quarters of an inch in depth. Sometimes the tonsil is levelled off as if by operation. Bacteria of the same appearance are seen in pyorrhœa alveolaris. The majority of cases occur in children. The symptoms are those of a sudden acute sore throat, and there is a possibility of contagion. The ulcer heals in from one to three weeks. The patient should be put to bed and given a gargle of sodium bicarbonate and boric acid. Both a fresh smear and a culture should be examined. The germs are two in number and the characteristic clinical picture appears only when both are present. There may be a symbiosis or the two may be a morphological variance of a single germ.

The Effect of Tobacco upon the Throat. The local or systemic effect of tobacco on the mucous membrane varies in individuals. That it does produce irritation in many cases is certainly true. In speaking of its effect upon the throat, S. W. Langmaid¹ says that in acute and chronic nasopharyngitis smoking must be abandoned or the cure is delayed. The hyperæmia may be due to the irritation from the smoke, but probably also to poisonous effects on the nervous centres. Susceptible persons, however, are affected by breathing air in which there is much tobacco smoke. Beside the nicotine, incomplete combustion gives rise to poisonous aromatic compounds. Too little attention has been paid to the large quantity of carbon monoxide set free and inhaled, especially in cigarette smoking. Deep voices do not seem to be as easily affected as the tenor or soprano.

Early Symptoms of Carcinoma of the Throat. Stenger² emphasizes the importance of paying attention to symptoms on the part of the nose, obstruction, etc., especially symptoms involving the nasopharynx, also to symptoms of a neuralgic character and ear symptoms. Attention to all these symptoms will in many cases disclose incipient malignant disease of the nasopharynx when none, taken alone, would ever suggest

¹ Boston Medical and Surgical Journal, June 15, 1905.

² Deutsche med. Wochenschrift, Bd. xxxi., No. 13.

it. Even slight symptoms on the part of the nose should compel examination of the nasopharynx, and obstinate neuralgia should never be dismissed as mere "neuralgia" without search for some objective lesion. The most important early sign of cancer is the development of ear symptoms ushered in by catarrhal affection of the tubes with neuralgic disturbances.

INDICATIONS AND METHODS OF OPERATION FOR LARYNGEAL CARCINOMA. E. von Narratil¹ says that the endolaryngeal operation is indicated only where the cancer exists in the form of an internal nodule without metastases. If microscopic examination of an excised piece shows that the growth is not a scirrhus squamous epithelioma, and if the part to be excised is smaller than one-third the larynx, and the tumor is free from adhesions and metastases, then it may be removed by laryngofissure without general anæsthesia or tracheotomy. The removal of part of the larynx, under general anæsthesia and with preliminary tracheotomy, is indicated when the cancer is an internal carcinoma (squamous epithelium) or of the basal-cell variety; provided there are no metastases and not more than half the larynx requires removal. In this case the wound must be left open and feeding is done by an œsophageal tube or nutrient enemata. In cases of external carcinoma this operation is to be done only for cancer of the epiglottis. Total extirpation is indicated in all other cases of external cancer, also in the initial stages of scirrhus or medullary carcinoma, and in extensive squamous epithelioma without metastases, or with only a few free enlarged glands. This operation is not to be done in cases of external scirrhus or medullary carcinoma of considerable extent, even though the neighboring glands are free from involvement. In such cases only a palliative, low tracheotomy can be performed. Advanced age is also a contraindication for total extirpation.

Treatment of Laryngeal Tuberculosis. This local form of tuberculosis is one of the most difficult conditions with which the physician has to deal. Owing to the location and destructive pathological alteration of tissue the aggravated symptoms demand constant alleviation. Unfortunately we have no specific remedy. Much was expected of the ultra-violet and x-ray, and while in some cases fairly beneficial results have been obtained, yet in general our expectations have not been realized. M. W. Dampel² has employed with beneficial results a 3 per cent. watery solution of phenosalyl. He has employed this solution in a large number of cases of laryngeal tuberculosis. In some cases it was used daily, while in others two or three times weekly; in a few instances it was necessary to cocaineize the laryngeal mucous membrane. His results are thus formulated: The more superficial the ulcer or erosion the

¹Archiv f. klin. Chirurgie, Bd. lxxvi. p. 695.

²Therapeutische Monatshefte, 1905, Bd. xviii. p. 165.

better the result of the drug; the ulcers healed in some instances after from three to five applications; deep ulcers required from one to two months, some healing not even then. Moderate infiltrations resolved themselves after some treatment; marked infiltrations did not yield very good results, and the worst results were noted in interarytenoid infiltrations. Hoarseness and aphonia disappeared almost altogether, and dysphagia improved in almost all instances. He considers phenosalyl as valuable as any substance yet suggested for this affection. Eight cases in which the tuberculous process disappeared altogether are reported in detail.

Barwell¹ recommends as a palliative the use of a laryngeal spray of a few minims of a 5 per cent. cocaine solution or an insufflation of morphine $\frac{1}{16}$ of a grain, with 2 grains of starch or 3 to 5 grains of orthoform, given half an hour before meals. The cough and catarrhal condition of the upper air passages should receive appropriate treatment. The remedial treatment is best applied in the form of pigments, of which lactic acid is the best and may be used in 40 per cent. to 50 per cent. solution, gradually increasing to 75 per cent. The lesions themselves are curetted when there is much infiltration and deep or extensive ulceration. In some cases more extensive operations, as tracheotomy, thyrotomy, or partial laryngectomy, must be resorted to. He shows in his latest reports that forty-four cures have been obtained out of 211 cases. Tuberculous laryngitis complicated by syphilis of the larynx or by pregnancy does badly.

Complications and Sequels of Laryngeal Diphtheria. B. Franklin Royer² discusses the complications immediately following intubation, or attempt to intubate, when, from reflex apnœa, cardiac or respiratory disturbances occur, of such gravity as to compel one to modify the procedure, or of such serious type as to cause the death of the patient. Royer states that atony of the cricoarytenoidei postici muscles may be a cause of acute stenosis after extubation. He also emphasizes the fact that reflex apnœa causes dangerous disturbances. Atony of the abductors causes a tube to be retained in many instances. Pressure paralysis and exhaustion of adductors frequently cause autoextubation. Retained tubes are also caused by pathological changes in the soft structure of the larynx and trachea. Such changes are often hypertrophic in character, following traumatism from the tube or loss of tissue from disease. There may be new cartilage formation in the perichondrium narrowing the lumen of the larynx, thus making a distinct pathological change. For reflex apnœa but little can be done. The courses of treatment open for the other conditions are: (1) Persist with intubation; (2) insert large tubes, allow-

¹ Edinburgh Medical Journal, February, 1905.

² American Medicine, October 28, 1905.

ing them to remain for long intervals of time; (3) when autoextubation becomes dangerous and large tubes are not retained, do tracheotomy; (4) intubate frequently while wearing the tracheotomy tube in order to prevent stricture stenosis; (5) with chronic stenosis due to contracting scar tissue, practice wide dilatation with persistent intubation; (6) consider Roentgen-ray treatment as a possible adjunct in softening scars causing chronic stenosis; and (7) avoid, if possible, tracheotomy as a means of curing a patient of a tube habit.

Immediate Closure of Tracheotomy Wounds. From a surgical standpoint this interesting subject is most ably treated by Miles F. Porter.¹ His views and observations are extremely practical, and while there is considerable surgical difference of opinion on this subject, yet his views are certainly worthy of consideration. Porter states that tracheotomy wounds are usually treated by the open method, whether the tracheotomy has been done for the removal of a neoplasm, a foreign body, or dyspnoea due to infection. In the presence of infection it is unquestionably better to drain the wound, provided, of course, that the cause of the dyspnoea has been removed. Immediate closure lessens the danger from pneumonia and from infection occurring in the wound itself, it shortens the convalescence and reduces to the minimum the deformity due to the scar; the latter being of particular consequence in females. He believes that the mortality in these cases may be lessened by immediate closure of the wound, and thinks that the morbidity may be decreased by adopting this method; the deformity certainly being lessened thereby. He calls attention to the fact that it is better to treat tracheal wounds by immediate and complete closure, save in those cases in which there is dyspnoea or infection, than by the open method, which is the one in vogue.

Intratracheal Injections. Considerable difference of opinion exists as to the advisability of this form of medication. In selected cases, especially in those in which ulceration exists, this form of medication is certainly beneficial, as shown by J. W. Gleitsmann. He considers that this form of medication deserves more attention than it has heretofore received. Judgment in the selection of cases, however, is necessary, and though the method is useful in alleviating the dry cough in the beginning stage of pulmonary tuberculosis, and may at a later stage favorably modify the putrid secretions in this disease, a cure is not to be expected from the procedure, *per se*. In bronchiectasis the injections are almost specific, and many, but not all, cases of asthma can be relieved in this way. Intratracheal injections are not to be recommended in acute inflammatory conditions, but they are most efficient in chronic tracheitis

¹ Journal of the American Medical Association, April 8, 1905.

and bronchitis, while tracheal syphilis has been cured and fetid pulmonary gangrene has been favorably influenced. The vehicle should be a bland purified oil, to which may be added menthol in the proportion of 1 to 15 per cent.; guaiacol and creosote carbonate from 1 to 2 per cent., etc. The laryngeal mirror is essential to the proper introduction of the cannula, which is preferably made of hard rubber and is used in connection with the Hartmann ear syringe holding one ounce.

Thymic Tracheostenosis. W. W. Carter¹ suggests that in all cases of laryngeal stridor it should be determined whether or not the thymus is enlarged. On account of surgical shock being badly borne by infants, if the symptoms are not urgent, postural treatment should be tried, and if, in any position of the head and neck relief is afforded, that position should be maintained by a suitable apparatus until nature has effected a cure by enlargement of the thorax, strengthening the tracheal rings, and diminution in the size of the gland. Intubation, tracheotomy, and artificial respiration do no good. The mediastinum should be opened, the gland brought forward and stitched to the tissue over the sternum immediately if there is danger from asphyxia.

¹ Manhattan Eye, Ear, and Throat Hospital Reports, March, 1905.

OTOLOGY.

By B. ALEXANDER RANDALL, M.A., M.D.

PROGRESS in otology for the past year has been characterized rather by the wider spread acceptance of rational methods already time-honored than by any running after strange gods. Good work has been done in all directions, but little of it is startling in its novelty, and some of the most valuable papers by aggressive men can be regarded as reactionary or fossilized. Yet it is to be hoped that such conservative checks will always be found in our literature, for not a few of the "new" ideas advanced from time to time were buried with all due honors long enough ago to have been generally forgotten, while some of the younger generation cannot be brought to any belief in measures older than their own brief experience.

"The Prolonged Treatment of Chronic Suppurative Middle-ear Diseases in its Relation to Radical Operation," a paper read by C. J. Blake before the American Otological Society (*Trans.*, 1904, p. 484), is one of these reactionary contributions; and the discussion of it showed its value to all who heard it. As Blake said, "it is far more easy to operate than to judge." . . . "The radical operation will in time take its place as a valuable necessary measure; but not until its value and its necessity have been more clearly defined and the comparative value of what may be called the middle-ear treatment, now fallen somewhat into disuetude except as a preliminary measure, has been not only farther defined but improved." He pointed to the need of minute study of the source of the discharge and the possibilities of curing it by minor measures thoroughly applied, with closing of the Eustachian tube by a flap of drumhead, removal of ossicles, curettement of the walls, and many other precise and conservative steps. This from the foremost teacher in America, fully at home in major operative measures, demands careful consideration by all otologists. Haug,¹ of Munich, took the same ground in his paper before the German Otological Society and advocated perhydrol in alcohol and glycerin followed by 10 per cent. compound glycerin of iodine and a wick of dry gauze. He had thus quickly healed 64 out of 98 cases of attic suppuration. Such has always been my contention, based upon upwards of 500 attic cases, that thorough cleansing and minutely careful treatment will cure most of these cases subjected by

¹ Münchener med. Wochenschrift, Bd. xxviii., Heft 29.

others to ossiculectomy. Only some 51 per cent. of cures are generally claimed for the operation and this upon statistics open to doubt; and I have cured (for years, and apparently permanently) not a few cases in which the hour had been set by another for operation. I feel sure that few that do not yield to thorough-going, non-operative treatment can be cured only by radical exenteration of the tympanic cavities. It is significant that the advocates of ossiculectomy are growing steadily fewer and the recorded cases are fewer. Much of this may be ascribable to the tide in favor of radical operations; more of it should be due to appreciation of the value of persistent, thorough treatment as advocated by Blake.

The Radical Exenteration for chronic suppuration of the middle-ear cavities without mastoid symptoms continues in high favor; but the reports of many clinics do not make clear distinctions between these cases and those radically operated upon for mastoid caries in chronic suppuration. Dench,¹ at the Bordeaux Congress, reports 98 cases with 71 cures, and slight remaining discharge in 16 cases. Four cases were lost sight of, 2 died, and in 5 there was failure. He calls for:

1. The complete removal of the upper wall of the canal so as to thoroughly expose the tympanic vault.

2. The removal of the posterior wall of the canal, avoiding the facial nerve, carrying out this step so completely as to entirely obliterate the posterior tympanic space—that is, that portion of the tympanic cavity which is hidden from view by the posterior wall of the external auditory meatus.

3. The obliteration of the hypotympanic space by removal of the inner extremity of the inferior wall of the canal in order to expose freely that part of the middle ear which lies below the level of the lower wall of the bony meatus.

4. A thorough curettage of the tympanic orifice of the Eustachian tube to cause a complete closure of this channel, and to prevent reinfection of the tympanic cavity from this direction.

The first and second of these rules are more precisely stated if we call for removal of the deeper squamosal portion of the canal which Leidy named the *scutum*. The fourth must be tempered by recalling that the carotid has little if any bony covering at this point.

Each discussion of the subject brings out the fact that the plastic methods employed all have their limitations, and all operators are seeking improved methods. Berens employs a comma-shaped flap from the mastoid integument, retaining a pedicle above until it has taken hold, but he admits many unfortunate results in the past. Brühl combines the flap of Siebenmann and Panse; but few seem to have adopted

¹ Archives of Otolaryngology, February, 1905.

my procedure of splitting the soft tissues of the back wall of the canal into its layers, cutaneous and periosteal, with excision of the interposed cartilage and fibrous tissues, so that two flaps instead of one, of the full size of the available tissue and properly thin, can be transplanted into the cavity. While limited also in its results, this method has seemed to me more rational and satisfactory than any put forward in literature, and has wholly replaced in my work any skin-grafting, primary or secondary. A useful addition is suggested by Bondy, who cauterizes the granulating areas which prove slow to dermatize with 10 per cent. solution of picric acid in ether. The pain is controllable by cocaine, and dermatization certainly proceeds with a promptness that is very gratifying. The effects of the operation upon the hearing are reported upon by various authors with widely varying results. Dench reports 14 of his cases improved, sometimes greatly, after operation, the hearing very fair in a large proportion, with only 2 cases in which the patient heard distinctly worse. Most authors admit a risk to the hearing, but Heath¹ operates primarily for the improvement of the hearing and urges the operation as much for this conservation as for the relief of the dangers of otorrhœa.

Local Anæsthesia of the External Ear by Cocaine Infiltration is dealt with by Laval, of Schwartze's clinic, and Neumann, of Politzer's clinic, the latter under the title "Technique and Indications for Hammer-Anvil-Extraction."² Laval tries to cocainize the nerve supply of the canal as its twigs enter front, back, and below; Neumann simply injects subperiosteally above at the beginning of the bony canal. Each uses 1 per cent. cocaine with adrenal and claims a painless operation, but the former principally in the canal and the latter in the drum cavity. The cocaine and aniline oil has evidently fallen somewhat into disuse, as its drawbacks—change of appearance and occasional aniline poisoning—made almost inevitable. No constitutional impression seems to have been noted by either Laval or Neumann, and it is notable that five or ten minutes' action is called for by each as requisite before the anæsthesia is fully established. Each admits the painfulness and limitation of his method, however, and it is to be feared that the advance is less real than they believe. Hammerschlag,³ however, confirms Neumann's claim, reporting a thoroughly painless ossicectomy in a very sensitive patient.

The Mastoid Operation receives a notable contribution in Frederick Whiting's monograph, a most elaborate presentation of the history and development of the simpler procedure. He holds that not only the whole mastoid cortex and contents should be removed but the tip taken off

¹ London Lancet, February, 1905.

² Archiv f. Ohrenh., Bd. Lxiv, pp. 142 and 167.

³ Monatsheft f. Ohrenh., October, 1905.

and search made for cells at the root of the zygoma. Each of these elaborations of the exploration has long been in use in appropriate cases, as has the backward extension of the incision of the soft parts; but many operators must question the wisdom of doing all of this in every case, in spite of the extremely favorable showing as to nearly total absence of secondary operations in his large series thus dealt with—many of them unfavorable subjects for prompt healing. The twenty-five full-page plates set forth each step of the operation and are accompanied by descriptions, with careful pointing out of difficulties and faulty methods. The work, if not ideal or wholly convincing, is an excellent contribution and a stimulus to every one working in these lines:

Dench¹ maintains, as of old, the same views as to removing the mastoid process, but does not always enlarge his incision backward nor explore the zygomatic region. In the discussion I held such rules to be good for the beginner, who is prone to be incomplete; but claimed that the expert can by good hæmostasis distinguish diseased bone and avoid needless exploration of that which is healthy. I also pointed out that too little is said about disease of the inner table, which I found involved in the majority of my cases, necessitating more or less extensive baring of the dura with frequent finding of extradural abscess—a most dangerous complication if unrelieved by good exposure and drainage.

From Schwartze's² clinic comes the annual report with 163 mastoid operations and the detailed study of the 19 cases ending fatally, 6 in acute suppuration. Six of the 9 sinus operations were successful. Ossiculectomy was done through the canal in 20 cases and success is claimed in all. In this and other clinics these operations are done more rarely and spasmodically. As Dench³ admits, in not a few of the cases reported as cured relapse occurs and the success proves fleeting.

Sprague⁴ reports 200 mastoid operations in patients from six weeks to seventy-nine years of age, 158 acute and 42 chronic, with 15 deaths, usually from pre-existing conditions. Conservation of all healthy bone, with scrupulous removal of all recognizably diseased, and partial or total closure of the wound with blood-clot gave 27 cures in fourteen days or less, 78 in three weeks, and 104 in four weeks or less. No case of facial palsy was caused, but 7 of 9 previously present rapidly recovered after operation. Of 8 cases of sinus thrombosis 6 recovered without ligation; 2, already profoundly septic, died. One case of cerebellar abscess with convulsions, hemiplegia of the opposite side, and coma for thirty-six hours after operation, recovered.

¹ Pennsylvania Medical Journal, October, 1905.

² Arch. f. Ohrenh., Bd. lxx. p. 55.

³ Transactions of the American Otological Society, 1904, p. 491.

⁴ Ibid., 1905, p. 156.

Dench in 98 radical operations had 2 unrelated deaths; 4 facial palsies, generally transitory, but one persisting a year, with slight facial involvement in 5 more—a favorable contrast to the 17 per cent. cited below.

A report of 281 consecutive mastoid cases at the New York Eye and Ear Infirmary with their results is made by Hill Hastings for the year 1903, and includes many instructive summaries. Of 447 admitted with acute or chronic suppuration (some 90 children, 19 under one year) 100 presented mastoid swelling, which in 56 children and 16 adults was pus under the periosteum, 37 had postaural fistula, 30 (23 children) from previous operations, while 7 more developed pus under a healed mastoid, all persistent otorrhœas; 48 operations were radical tympano-mastoid exenterations for chronic otorrhœa without mastoid trouble, 25 more were secondary, 44 were for mastoiditis in chronic suppuration, and 154 for acute trouble. There were 17 deaths, 8 among the radical and 9 in acute cases; facial palsy occurred 20 times in 117 radical interventions.

Moure and Brindel,¹ of Bordeaux, report 500 mastoid operations, 231 simple and 269 total exenterations; in the first group 14 and in the second 18 died of complications. Of 142 exenterations for uncomplicated tympanic suppuration all are stated to have been successful. In 113 cases the inner table was diseased and in 9 marked extradural abscess was present; in 42 cholesteatoma; sinus thrombosis was met in 6, and brain abscess in 5; labyrinth suppuration was 12 times present.

TOPOGRAPHY OF THE MASTOID. Schilling² gives his results from measuring the cranial conformation as a possible guide to the mastoid topography in 222 cases operated upon. This was done to find the clinical facts as to Koerner's claim of more dangerous relations on the right and in the brachycephalic, and proved confirmation of my anatomical theory that the index of the cranium affords no practical indication of the probable position of the sigmoid sinus of the middle cerebral fossa.

Amberg contributes a note³ on "Protruding Lateral Sinus," reporting 12 temporal bones of those examined by him, as showing less than 10.6 mm., which he figures as the requisite space between sigmoid sulcus and *spina supra meatum*. One, a left temporal, had apparently only 2.5 mm. This confirms my findings in 500 crania⁴ where among the 1000 temporals 114 had less than 10 mm. (39 of them 5 or less, and 11 only 1 mm. or less) of bone between the meatus and sulcus, one bone showing a large dehiscence into the right meatus, through which the sigmoid sinus

¹ Arch. f. Ohrenh., Bd. lxvi. p. 74.

² Zeitschrift f. Ohrenh. xlvii.

³ New York Medical Journal, September 9, 1905.

⁴ Trans. Pan. Am. Congress, 1893.

has probably protruded. Yearsley examined 1017 skulls with reference to the presence of the Henle *spina supra meatum* and noted its total absence in 155, while in a large additional number it was slightly developed. The depression behind it, however, was always recognizable to the expert and makes a constant mark for locating the antrum. This constitutes a more frequent absence of the spina than my investigation would indicate, since it was absent in but 5 of 180 temporals in which this matter was observed, in each instance on the right side. Keiselbach found it in 82% of juvenile and 87% in adult bones, and I have rarely missed it in upward of 500 mastoids operated upon. It is, therefore, one of the constants of the skull, more uniformly determinable than the external occipital protuberance, and marks the point upon the mastoid surface just behind which we should generally enter to drain the antrum. But the fact that this so usually marks the nearest point to the antrum should never lead us to forget that the sigmoid sulcus may lie very superficial at this exact point, possibly even visible through the intact bone. The recognition of the spina is important, therefore, but not as marking a certainly safe point of entry.

Subcranial and Vertebral Complications of Ear Suppurations. Laurens,¹ of Paris, deals with this subject and reports 13 cases which he divides into prevertebral, subpetrous, and occipital, both in relation to their causation and in respect to their surgical treatment. Intervention must be prompt and thorough, as osteomyelitis may be widespread and pyemic tendencies are grave. I have met at least 2 such cases where the atlas and lower vertebra as well as the skull-base were carious, and in several of the digastric cases have had postpharyngeal abscess, which gave, however, little special trouble. Goris, of Brussels, has also put cases on record. They may belong outside of the field of the otologist; but mine have come to me from the general surgeon.

Operation for Phlebothrombosis of the Lateral Sinus. John D. Richards² has contributed an elaborate paper on "The Operative Treatment of Infective Sigmoid Sinus Thrombosis." Basing his study upon 44 cases, of which 15 were his own, he has widely varying forms and phases of the disease to consider, and the differing technique of the various operators has furnished rich suggestions. Urging rapid work, as must all who realize the conditions to be met, he calls for completion of the mastoid work first, then wide exposure of the lateral sinus. He uses the chisel rather than the rongeur, which he claims can too often disrupt the vessel and thrombus. He begins the exposure as near as possible to the bulb, seeking to get below the clot. He notes that in 61 cases operated on at the New York Eye and Ear Infirmary, 46 showed the

¹ Arch. f. Ohrenh., Bd. lxiv. p. 61.

² Archives of Otology, 1905, vol. xxxiv. p. 378.

clot to be above the bulb where it could be isolated, as was the case in 7 of his own 15 cases, all of which recovered without metastases, although the jugular was not tied. If the lower limit of involvement is not readily brought to view he passes at once to exsect the jugular. As to the existence of clot, however, Richards believes that slitting the vessel affords the only means of diagnosis, since most of the symptoms set forth may be misleading and exploratory puncture is especially unworthy of trust. With gauze pledgets laid upon the vessel in readiness to compress it, the sinus should be freely slit "regardless of its appearance, of its feel, or of its pulsation," but with avoidance of all manipulation which might break up and disseminate a septic mass. The inner wall of the sinus must be carefully avoided, lest not only an infection of the meninges but hernia cerebri result, as he has twice seen. The mastoid emissary he believes should be exposed and controlled or a serious source of error is retained, and the superior petrosal should be explored if no clot is found in the sigmoid. Laying stress upon the incompetence of all external tests of the presence of thrombus by reason of the communication of the emissary, the condylar and other veins, as well as the possibility of merely parietal clot, he holds curetting through a small opening to be indecisive and dangerous. The diseased sinus wall throughout the extent of the thrombus should be exsected to give free access to its interior and contents and permit search for any fistula, as well as to remove the septic tissues. If a clot is attached to the wall, the intima is there lost and the vessel should be treated as an abscess cavity. The return flow of blood, however free and apparently ample, is not to be accepted as proof that the sinus is clear, still less that the jugular is free and the blood is regurgitating from it. He contends that curetting of the lower sinus and bulb (the latter being generally a futile effort) even with good backward flow of blood does not insure exit of thrombus masses, while the aspiratory effect of the chest movements is strongly drawing all movable material down toward the heart. Even where no metastases occur in unligated cases flitting pains about the body probably tell of disseminated clot particles which fortunately were not destructively septic. As no one can decide that the clot in an infectious case is aseptic it is trifling with mortal danger to risk its extension by leaving the jugular open.

If haste demands that the curetting must be attempted before the ligation, both jugulars should be compressed to preclude aspiration of dislodged particles; while at the same time a stronger back flow is obtained to flush the bulb and sinus. The intracranial venous sinuses are not distinct vessels but parts of a system, and aspiration of the one bulb may take place through the opposite jugular when obstruction has reversed the usual current directions. Primary jugular ligation or

resection Richards thinks is rarely indicated except in the presence of metastasis; it should be usually done after sinus exploration has proved its need, but it should not be delayed for a later intervention. He favors resection rather than ligation as lessening the chances of a prompt establishment of collateral circulation preventing isolation of the infected area. Reversal of the tributary blood currents should be prevented by packing gauze into the bulb. In dealing with the jugular, ligation should be done at the lowest possible point and the vein resected with each of its tributaries so far as they seem thrombosed. Irrigation of the bulb is claimed to be unsurgical and dangerous, and should be substituted by curetting thoroughly from above and below all accessible portions, and cutting away with scissors of all septic wall. The neck wound should be packed, not sutured. Richards' valuable paper is unfortunately long, rather involved in style, and its reiterations do not always add force. It represents, however, in many respects the best practice in this field, and its divergences merit careful consideration. It proves too much in respect to the dangers in every direction; but this may be well as an offset to those who lay down a single line of procedure as if it were unchangeable and infallible. In discussing the effect of gravity upon the blood currents Richards seems to forget that the patient is usually recumbent; while other hypothetical points obscure his many real and admirable observations and may tend to lessen their due acceptance.

Somewhat in contrast is Eugene Crockett's paper entitled "Seven Cases of Thrombosis of the Lateral Sinus; Ligation of the Internal Jugular; Recovery in All."¹ He cites also 4 previously reported cases, making 11 consecutive cases, with the same favorable result. The clinical detail of each case is given with little disquisition upon theoretical aspects of the matter. In each instance he ligated the jugular about the middle of the neck and only resected sufficient for study. In two patients the vessel was already collapsed and cord-like; in two others the sinus clot was not curetted away; yet all recovered, as have all his other previous ligations. In two instances the ligation was secondarily done because the evacuation of the lateral sinus did not check the septic symptoms which ameliorated immediately after the jugular was tied. He concedes the great difficulty at times presented in finding and securing a jugular embedded in plastic exudate and covered by inflamed glands; but even when it has cost him an hour's work to ligate he has felt that it was needful and wise to do so. Before he practised ligation he lost a number of cases, and in the *Transactions* of the Otological Society for 1895 reported 13 autopsies. He has had no deaths to report after ligation, as done in the past four years, and recovery has been far more prompt.

¹ Transactions of the American Otological Society, 1905, p. 89.

Arnold Knapp reports a case of infectious thrombosis from acute suppuration which died from meningitis due to reinfection from the lateral sinus near the torcular, where it had been freed by operation. Cases of afebrile phlebothrombosis are reported by Alexander, from Vienna, and Hill Hastings, from Los Angeles, both recovering after operation, masked cases which might easily give rise to fatal inaction.

H. Gifford¹ commends Alexander's plan of stitching the end of the jugular in the skin wound, but earnestly combats the use of dry gauze in the wound. He claims that this tampons instead of draining. Gauze wet with 1:1000 bichloride and covered with gutta-percha tissue should be substituted and changed twice daily. He reports a cure in 3 of 5 cases so treated. He commends Eemann's use of packing with boric powder, but believes more frequent dressings then needful.

Jugular Bulb Thrombosis. J. F. McKernon,² of New York, read a notable paper before the American Otological Society, at its recent meeting in Boston, upon the primary thrombosis of the jugular bulb in children, complicating acute middle ear suppuration. Holding that the infection of the jugular bulb by direct continuance of the inflammation from the adjacent floor of the tympanic cavity is more frequent than commonly supposed, he has applied the knowledge to those cases where an unduly high temperature after tympanic evacuation and by timely operation in a series of six cases he has the satisfaction of reporting the successful removal of an infected thrombus from the bulb and securing healing in four of the cases. He lays stress upon the occurrence of widely varying temperature, reaching to 104° or more by sudden rise without chill and dropping again as abruptly to the normal or below it. But the cases differentiate themselves from the usual sinus and jugular thrombosis in the marked remission of all symptoms on alternate days, perhaps, and the deceptively good appearance of the patient between the exacerbations. The child, who is one day seriously ill with marked temperature fluctuations, may be playing with toys and sitting up if allowed, apparently nearly convalescent, on the next day, only to suffer a return of the disquieting symptoms as severe as ever on the next. A general typhoid condition will suddenly develop if the case is permitted to run unaided. The blood may show streptococci or other infective organisms. The polynuclear leukocytes show a percentage of 80 or 90. A striking point in four of his findings is that with no mastoid involvement a blood-clot which showed pus and general streptococcus infection was not cut off by jugular ligation below, and yet recovery took place with little delay or evidence of extending sepsis. He strongly advocates promptness in oper-

¹ Archives of Otolaryngology, August, 1905, p. 304.

² New York and Phila. Medical Journal, July 1 and 8th.

ation, especially in the stage of remission, forestalling the return of high temperature with its depression of the recuperative power.

Such septic thrombosis without mastoid disease, here macroscopically and in two cases microscopically sought, is rarely observed; perhaps it is overlooked. In the discussion, I renewed the claim urged for six or eight years that in acute otitis it is the bulb which is more often involved. In chronic otorrhœa the knee of the sigmoid sinus is the usual starting point of phlebothrombosis and there is little self limiting tendency. Hence jugular ligation is generally needful, certainly is safer in chronic cases; while the majority of acute cases show spontaneous occlusion of the vessel at the foramen lacerum. In infants the sigmoid sinus is relatively remote from the tympanic cavities, the vessel having not yet embedded itself in the bone. The jugular bulb, although also little developed, must always be close to the tympanic floor, with most intimate vascular connections. If such anatomical and pathological conditions are borne in mind many apparent discrepancies in the experience of different observers find ready explanation.

Brain Abscess. Herman Knapp,¹ who had been chosen to open the topic of brain abscess at the International Otological Congress at Bordeaux, defined the operation through the squama as the surgical as contrasted with that of the otologist through the mastoid. The well-confirmed fact that the abscess is in 80 per cent. of cases in immediate relation to the diseased bone and that drainage may be better in this line are strong points in favor of this view; yet it must be remembered that localization is often impossible and that we must often operate when even the existence of an abscess is in doubt. Schmiegelow urges the mastoid route, therefore, as available for both cerebellum and cerebrum. To explore through a septic mastoid into brain tissue that may be normal and very susceptible to infection does not seem good surgery. If the mastoid be already open and the location of the abscess almost certain, as in aphasic cases, penetration through the exposed tegmen is more justifiable, and numerous recorded successes, such as Jack's, show its safety. But in the more vague cases when abscess, if present, may be on the other side of the head, and with no differentiation between a seat in the parietal lobe and cerebellum, one can more truly say that his exploration will probably be harmless if he makes a *separate* aseptic trephining. In the further discussion at Bordeaux stress was laid on the danger of respiratory paralysis from pressure, and chloroform was urged as less apt to increase this pressure. Artificial respiration, at times through the trachotomy tube, must be maintained in order to keep the patient alive through the operation. Seeking the abscess before opening the mastoid was generally deprecated as offering

¹ Archives of Otology, August, 1905, p. 343.

no sufficient advantage. In Jack's paper¹ 43 cases of brain abscess were cited as operated upon at the Massachusetts Eye and Ear Infirmary and other Boston hospitals with only 7 full successes, secondary abscess having frequently been the cause of death. Macewen urged delay if possible after the mastoid operation. He exposes the dura and uses carbolic acid, 5 per cent., to promote adhesions. He irrigates brain abscesses with 2½ per cent. carbolic and avoids drains.

Dundas Grant,² at the Otological Congress, cites Okada as claiming 56%, and Whithead 71% of the cerebellar abscesses to be due to petrous cavities generally involving the labyrinth. The other abscess in the cerebellum he ascribes to sinus thrombosis. Hence the labyrinth should be opened in cerebellar abscess unless the sinus is clearly the source of the disease.

Duel³ reports 3 cases illustrating the difficulties in diagnosis of "intracranial extension of suppurative otitis in the presence of pulmonary complications." The first instance occurred in a child aged eight years, just recovering from bronchopneumonia. A severe cough followed the mastoid operation under chloroform, and high temperature persisted for twenty-four or forty-eight hours with intermittent drops to normal. Delay was advised as the bared sinus looked healthy, but exploration of it showed disintegrating clot extending into the bulb. The jugular was tied and excised with the enlarging glands along its course. Primary union followed and recovery was good. In 2 other cases otitic pyemia seemed present and no signs of pneumonia, yet expectancy was justified by clear pneumonic development. Recovery took place in both instances. In one case Duel believes that thrombosis was present (more probably only phlebitis).

Stenger⁴ reports 3 cases of *otitic meningitis* marked by high temperature, nausea, and deep stupor, but alternating with periods of mental clearness. One patient had ptosis and wide and sluggish pupil on the affected side, with slight opisthotonus. The second had optic neuritis with retinal hemorrhages, slow pulse, and sinking spells that threatened death. The third had labyrinthine caries with abducens-paralysis, opisthotonus, and twitching of the right arm. In each case opening of the affected and thickened dura, generally as a secondary operation after the aural disease had been vigorously dealt with, gave exit to excessive amount of clear serous fluid, which soaked successive dressings. No intradural pus was evacuated, but each patient improved at once and recovery was in each fairly prompt and complete.

¹ Transactions of Otology, Laryngology, and Rhinology, 1905.

² Arch. f. Ohr., 65, p. 155.

³ Laryngoscope, January, 1905, p. 42

⁴ Arch. f. Ohrenh., Bd. lxxi. p. 144

Pathogenesis, Diagnosis, and Operative Treatment of Suppurative Disease of the Labyrinth. This subject is dealt with by Politzer¹ on the basis of a large series of observations, including fourteen minute examinations of patients dying after a radical mastoid operation. He notes penetration of the infective process through the ligament of the oval window, through the round window, or through the boss of the promontory, as well as through the floor of the tympanum into the first turn of the cochlea; but seems to have less frequently seen the more conspicuous necrosis of the horizontal semicircular canal, which is reported by most observers. He credits to Gohn the discovery of new anaërobic bacteria, sometimes in pure cultures, which seem especially capable of destroying the compact bony walls of the labyrinth. He notes the frequent absence of the usual signs of labyrinthine disease or their masking by others not characteristic, and lays more stress upon the examination with the tuning forks as to reduced bone conduction in spite of lateralization to the affected side and marked impairment of all tones through the air. In operating Politzer advocates chiselling from behind forward, removing all the horizontal and posterior semicircular canals, and opening up the vestibule, and would undertake it even in the presence of symptoms of meningitis, since he has seen these disappear even after such intervention.

Lenge² reports a case of tuberculous disease of the temporal bone marked merely by delayed healing of the operation for acute mastoid empyema. Radical exenteration was done after four months and tuberculous involvement of the labyrinth was found. The facial was widely laid bare, but not injured, and the ossicles were found intact. Only nystagmus had been present to mark the labyrinthine lesion. This nystagmus is claimed to disappear promptly after the opening or removal of the labyrinth; when it does not it is almost pathognomonic of cerebellar abscess, which so often complicates as cause or effect the labyrinthine necrosis. The surgery of the labyrinth is making rapid advances, but it is still too early to estimate justly what has been accomplished. It certainly promises well.

Meniere's Disease and its Treatment with the Galvanic Current. Sugár,³ of Budapest, discusses the subject of Menière's disease and advocates strongly the retention of this name and the recognition of a distinct pathological entity differing from the various forms of Menière's complex of symptoms, which he thinks have befogged the proper comprehension of the matter. Discussing the symptoms of vertigo, nausea, and somnolence and differentiating them from the more neurotic occurrence of

¹ Allgem. Wiener med. Zeitschrift, December 6, 1904, No. 49.

² Monatsschrift f. Ohrenh., September, 1905.

³ Arch. f. Ohrenh., Bd. lxiii. p. 217.

some of the symptoms, he claims "only then can we speak of Menière's disease when without obvious cause the known morbid picture occurs whether in apoplectic form or not and the symptom-complex is fully developed." Passing then to the subject of its electric treatment he cites the work and views of Doneth, Gescheid, Bloch, and Veraguth, and reports a case of his own in which notable improvement followed the cautious employment of the galvanic current. He cites the observations of Rohrer, where Menière's disease developed after accidental electrization by high-potency shock; and advocates the employment of a large (72 cm. area) cathode upon the neck, with a small disk-like anode at the tragus, and the cautious, gradual employment of the current for five to ten minutes in a strength which may begin with but a fraction of a milli-ampère, and should never exceed 5 ma. The reduction of the current should be as gradual as its onset, and the sittings can be daily or at longer intervals as the circumstances suggests. The current should be applied to the opposite ear for an equal length of time in the bilateral cases. Such observations have been as yet too infrequent and possibly prejudiced to carry the fullest conviction; but so disabling and obstinate a disorder deserves close study, and this contribution may prove a real aid in its conquest. The same may also be said of lumbar puncture, which has been used and commended by several careful men for the relief of aural vertiginous conditions. It promises well, for its temporary benefit is at times great, but time alone can prove the safety of its use and the permanency of its effects.

Otosclerosis. Hirshland¹ urges a more extended test of the value of *thiosinamin*, or better its more soluble equivalent, *fibrolysin*, as advocated by Sugár. Hirshland claims great results from fibrolysin, especially in severe otosclerosis cases. He does not wholly reject its employment by the mouth or its local use in the tympanic cavity by catheter; but believes the major value rests with hypodermic injections. He has employed the drug hypodermically many hundreds of times with no ill effects.

Martin Sugár² writing on "The Phosphorus Treatment of Otosclerosis," renews his commendation of the thiosinamin or fibrolysin treatment, and criticizes the usual forms of administration of *phosphorus*. He questions the comparability of otosclerotic formation of spongy bone in the labyrinth with the rachitic processes; but regards the empirical success of some observers as justifying continued test of phosphorus. Yet the doses advised he claims to be dangerous, and after wide consultation with clinicians and pharmacologists commends the use of the organic preparations, especially that known as *phytin*.

¹ Arch. f. Ohrenh., Bd. lxiv. p. 107.

² Ibid., Bd. lxvi. p. 36.

Auscultation of the Middle Ear in Catheterization of the Tube. Two papers from Schwartz's clinic in Halle deal with various aspects of this procedure. Uffenorde,¹ from a series of studies upon the cadaver as well as on operated and normal patients, concludes that "distant auscultation sounds may be not only in the pharynx or tube, but even in the tympanum itself if obstructed. Plastic obstacles if anywhere between the catheter end and the drumhead of the observer may absorb or reflect all sound. Bubbling is at the catheter end, with the tympanum merely serving as a resonator. Rales do not indicate the consistence of secretion nor the site, although those formed in the tube are usually finer and higher in pitch than in the drum cavity. An after-sound is sometimes heard in the tympanum as the fluid returns to its level or the bubbles burst. Secretion is displaced from the drum cavity in favorable cases, principally into the pharynx, with dissemination only when very small in amount. A piping 'perforation whistle' only marks the presence of fluid, or occasionally of cicatricial bands, with no relation to the size of the opening, since no drumhead need be present to share in its production."

Laval² made a parallel study, but using an auscultation tube in the nose as well as the ear of the patient or cadaver. He reports as his results that "noises arising at the tube mouth are loudly heard through the nose even without the tube, but are dull, faint, and distant as heard from the ear; those occurring in the tube are about equally heard through ear and nose; while sounds originating in the drum cavity are heard through the ear, but not at all from the nose." Much that was variously or vaguely stated in these matters becomes much clearer from these studies, and it is to be hoped that many who have neglected to employ the valuable aid of the auscultation tube will hereafter learn its use.

Friction Massage. Urbantschitsch renews his recommendation of "friction massage" of the isthmus, now employing an electric motor to actuate the olive-tipped celluloid bougie. He calls for great caution and limits it to chronic cases responding to no milder treatment. He finds twenty to forty treatments needful, and notes marked injection of the middle ear after each. He reports a series of improved patients, although frankly adding others where the treatment was abandoned as useless or undesirable. Although very complex and demanding skill and much caution the measure bids fair to prove a real addition to our aids, some of his cases showing great benefit as to both tinnitus and deafness.

Harris³ reports again as to the dangers and shortcomings of the electrolytic bougie, holding it to help often mechanically only, some-

¹ Arch. f. Ohrenh., Bd. lxvi. p. 1.

² Ibid., p. 120.

³ Transactions of the American Otological Society, 1904.

times galvanically. The discussion supported his view of its slight value.

Syphilitic Involvements of the Acoustic Nerve are discussed by Rosenstein,¹ of Brieger's clinic, in Breslau. He seeks in vain in a study of some 66 cases reported by himself and others for clear differential signs to diagnosticate lesions of the nerve trunk from those of the labyrinth or even of the nuclei or paths within the encephalon. He finds most of those criteria laid down by Gradenigo and others to be inconclusive in these as in nerve deafness of other causation. The loss of middle rather than of the high tones, more usually defective in lesions of the perceptive apparatus, was present in but one of the 14 cases accepted as clear, and the watch was heard disproportionately well by tone in but one. The usually marked loss of tone conduction was wanting in one case where deafness was extreme for tones through the air. The galvanic reaction as to which Brenner and Gradenigo are contradictory seems often unreliable, and we are compelled to rest any diagnosis principally upon the coincident involvement of the facial and other adjacent nerves and the inferences thus supported. Treatment seems to have been generally efficacious, and only when neglected have the conditions recurred and gone on to the fatal result which permitted the instructive autopsies which are the basis of study. Although rather negative in its findings, such a critical essay has great value in clearing a misty field of important investigation.

Middle-ear Complications of the Acute Exanthemata. Of great general interest are the further studies in this direction, as the curative and prophylactic possibilities are so important to all practitioners.

SCARLATINAL OTITIS is discussed by Sprague,² of Providence, with a protest against the physician who still regards otorrhoea as rather a good thing in scarlatina. He cites the statistics showing 10 per cent. or more of cases of otitis in scarlet fever, and that a large proportion of deaf mutes have been made such by its ravages, not to speak of the numerous pyæmic outcomes less immediate, but more deadly. Pointing out that a large proportion of cases give little evidence of pain, he urged the importance of having the attendant on the lookout for restlessness, putting the hand to the ear, or any sudden rise of temperature, any of which call for prompt study of the ears. Drumhead incision should be prompt and thorough; and although in the necrotic form of invasion it may not prevent the exfoliation of drumhead and ossicles, generally it will relieve suffering and danger and shortens the attack. He advises warm antiseptic irrigations of boric acid, with an ice-bag to the mastoid if tender

¹ Arch. f. Ohrenh., Bd. lxx. p. 193.

² American Journal of the Medical Sciences, September, 1905, p. 423.

and swollen. He makes no mention of the prophylactic covering of the ears for protection from changes of temperature, upon which Pepper wisely insisted in all eruptive fevers, but urges the need of prolonged quarantine for those with suppurating ears, since he has seen infection thus spread after all desquamation had ceased.

Herzfeld¹ reports double labyrinthine necrosis with paralysis of facial and acoustic nerves as beginning on the fourth day of a case of scarlet fever.

Jarecky² ascribes the otitic complications to the toxins of scarlet fever, to extension from the throat, or to general weakness, and urges the necessity of prophylactic removal of adenoids and other nasal obstructions. He favors hot irrigations and 10 per cent. carbolic glycerin in the ear, with avoidance of opiates, leeching, and iodide applications over the mastoid.

Passow,³ in an address before the Congress of Balneologie, grouped ear diseases into three categories, *i. e.*, idiopathic, secondary to general diseases, and as associated with lesions of adjacent structures, and laid down suggestions for the bath and climate treatment of each. He advocated for the last group sea bathing or baths, but only after reduction of tonsils and other involved structures to fair conditions. In the chronic catarrhal and otosclerotic cases he looked for much benefit from climate, warning against ocean bathing, especially in the North Sea, and advocating more collaborations of the subject by otologists and balneologists.

MEASLES. Nadoleczny⁴ reports upon 100 cases of measles in an epidemic at Munich, and notes 13 per cent. of purulent and 46 per cent. of non-suppurative inflammation of the middle ear, while some of the remaining 40 per cent. gave some evidence of subacute inflammation. He concludes that middle-ear inflammations are the *most* frequent complications of measles, often primary rather than sequels, and demand cautious but conservative treatment of the nose and throat. The serious complications in the mastoid, labyrinth, or cranial cavity are rare, but must be guarded against; and the neglected cases are responsible for a large group of the chronic and destructive middle-ear affections.

Weiss claims by placing pledgets of weak silver solution in the nostrils and carrying it backward by pressure to have reduced the percentage of otitis in measles from 27 to 7 per cent.

Gerber⁵ ascribes necrosis of the labyrinth in 55 per cent. of cases to scarlatina and only 11 per cent. to measles.

¹ Berliner klin. Wochenschrift.

² Medical Record, February 25, 1905.

³ Berliner klin. Wochenschrift, 16, 17.

⁴ Jahrbuch der Kinderheilkunde, Bd. IX.

⁵ Arch. f. Ohrenh.

DIPHTHERIA. Spangenberg among a thousand diphtheria cases met with ear trouble in 24 per cent., and notes the occurrence of virulent cultures from some very mild cases which progressed benignly, in contrast to others sometimes fatal, with hardly recognizable occurrence of the bacteria in the ear. I have noted the same discrepancies.

Lewin's study of the pathological anatomy shows that there is apt to be stasis and probably thrombosis of the vessels in the auditory canal, with degeneration of the ganglion cells as the cause of the deafness; probably from toxins more often than from direct mucous membrane extension.

The same type of affection has been observed by Alt from *influenza*.

TYPHOID FEVER. Discussing "Purulent Otitis Media Complicating Typhoid Fever," Ewing W. Day and Chevalier Jackson¹ ascribe its frequency to the severity of the attack and height of the fever with its reduced resistance of the tissues. Of 88 cases 71 had a temperature of 104° or more for a week and 30 105°, and no case was met having temperature below 102°. That otorrhœa is now more frequently seen in typhoid fever may not be due to bathing, but to the past twelve years of grippé.

Tests of the Hearing. A committee consisting of Politzer, Gradenigo, and Delsaux² made a report to the Bordeaux Congress on hearing tests. They point to much careful investigation and certain steps of advance, but find much still indeterminate and disputed. The voice, with all its variability, is conceded to be most valuable as a quantitative test in whisper and less often in conversational tone, uttering well-chosen test words with the reserve air available after tidal respiration. The watch and Politzer acoumeter are principally valuable for testing tone conduction. The tuning forks are preferable for most qualitative tests and low tones are selected, 64 and 128 rather than 512, for the comparative tests of Rinne and Schwabach. I am glad to note that they put aside the Edelmann Galton whistle as defective as well as costly and test the upper limit with a few Koenig rods. Many will be pleased to hear that they hold that all the needful instruments ought to be obtainable for twenty dollars. Gradenigo's scheme, which differs little from mine, is commended for recording the findings; it included Schwabach's, Rinne's, and Weber's tests, conversational and whispered speech, the acoumeter, the watch by air and tone, the upper and low-tone limits, and Politzer's test for Eustachian patency. Nothing is said as to standardizing the forks or the blow, and they reach no decision for one or other of the conflicting views as to the intensity relations of the sounds of dying-down forks. The "hearing threshold" as laid down by Ostmann³

¹ Laryngoscope, November and December, 1904, p. 952.

² Archives of Otology, 1905, p. 328; Arch. f. Ohrenh., Bd. lxiv, p. 63.

³ Archives of Otology, August, 1905, p. 267.

is commended in that with the Bezold-Edelmann forks (C 64 and G 99) the amplitude of the vibrations has been measured and the limits for normal hearing determined, permitting precise comparisons with defective cases. Pause offers an electrically actuated tuning fork enclosed in a sound, tight cabinet, with openings of variable sizes to control the intensity; and Bryant¹ has devised a phonograph carrying the test words which are heard through one or other of the ear tubes in an intensity easily controlled by a four-way cock minutely graduated. Complex apparatus or methods will never receive wide acceptance; but these efforts to find sure and common ground for our tests of hearing are threshing out much chaff, and eminently practical and reliable methods are being brought nearer realization.

INSTRUMENTAL AIDS TO HEARING. Szenes,² of Budapest, considers "what is to be done against the misuse of apparatus put forward for curing all deafness," and sets forth the conscienceless claims of inventors and the too indifferent attitude of the medical profession. He was able to arouse his local medical society, and at its instance made formal protest in the Patent Office against a "new thermoelectric ear apparatus against tinnitus and deafness" as a catchpenny, pseudoscientific, and often harmful appliance. Public hearing was accorded him and the claims as to construction and application of the apparatus judicially investigated, and the apparatus, which is patented under different names in various countries, was denied the grant of a patent in substantiation of his protest. Too little has been done in such directions elsewhere. In the American Otological Society some years ago the claims of various "phonomassage" instruments were exploded and their possibilities for harm to the hearing set forth. I³ have contributed a signed editorial discussing the tendency of medical men to support all sorts of quack appliances of this kind, especially if they claim to be electric. The journals, medical and lay, are full of advertisements, and every inquirer is petitioned for the names of all notably deaf acquaintances so that they may be reached by personal correspondence. Some are asked to fill out charts of symptoms; yet a study of these data leads ever to the conclusion that the case is curable, but only by the marvelous powers of the apparatus of the advertiser. A toy compass is packed in the case with some forms of apparatus so that its deflected needle may give proof of the magnetic force present, which is to regenerate the damaged ear, although too weak to pick up the smallest needle. The telephone is a favorite form; but makers of little Toynbee's artificial drumheads advertise their "invention" as "ear phones," and buying advertising space in

¹ Transactions of the American Otological Society, 1904.

² Arch. f. Ohrenh., Bd. lxiv. p. 254.

³ Monthly Cyclopedia of Practical Medicine, July, 1905.

medical journals spread broadcast the words of their paid advertisement as "what the official organ of the University of — says in favor of the — ear-phones."

Since the excessive claims made even by our average instrument makers are bad enough, it behooves medical men to see that their patients test a number of the probably useful forms of trumpet or other appliances at a respectable shop and then try every available specimen of that form which seems most useful, since there is a large individual equation both in the patient and the apparatus. It is well to remember that the Lenval prize has stimulated scientific men to a thorough testing of all promising forms of apparatus to aid the deaf, and that they have found the microphone to be of *no* value; so the vaunted value of similar appliances now unduly advertised need not be accepted without question. The telephone transposes sounds to a much higher key, changing the low tones, especially of male voices so ill-heard by most deaf persons, to a high treble that is easily within their range. Thus any form of portable telephone has value for some cases, but this is no excuse for selling such at ten times its real value.

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